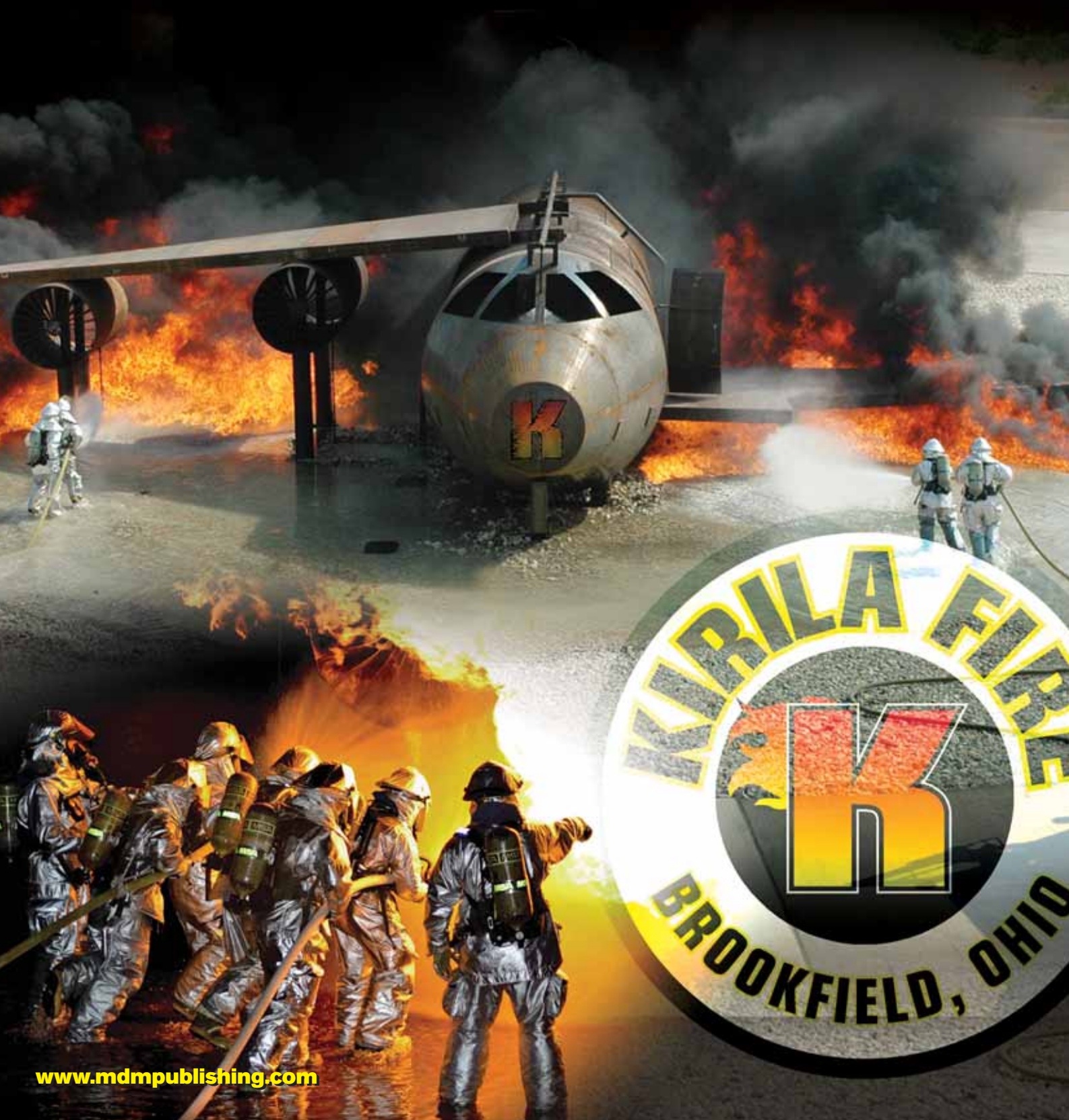


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INTERNATIONAL FIRE FIGHTER

Reporting Worldwide to Municipal, Industrial and Fire Training Professionals



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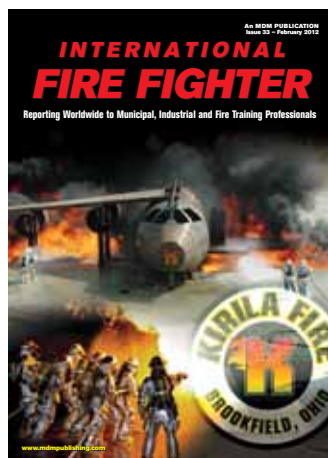
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Contents



19-22

**6-16 News &
Profiles**

**19-22 Confined
Space Training**

**25-28 Monitoring
Ahead**

**31-34 Evaluating
and Implementing
PPV**

**36-38
Fundamentals of
Vehicle Extrication**

**41-44 Airport
Firefighting - A Day
in the Life**

**47-51 New
Firefighting Vehicle
Round-up**

**53-56 Thermal
Imaging Cameras
Buyers' Guide**

**58-59 LNG Plant
Fire Safety**

**61-64 Decade of
Disasters Puts
Pressure on
Firefighter Training**

**66-67 Fall
Protection Products**

**68-71 Selecting
Hoses and Nozzles**

**72 Advertisers'
Index**



47-51



25-28



53-56



31-34



61-64



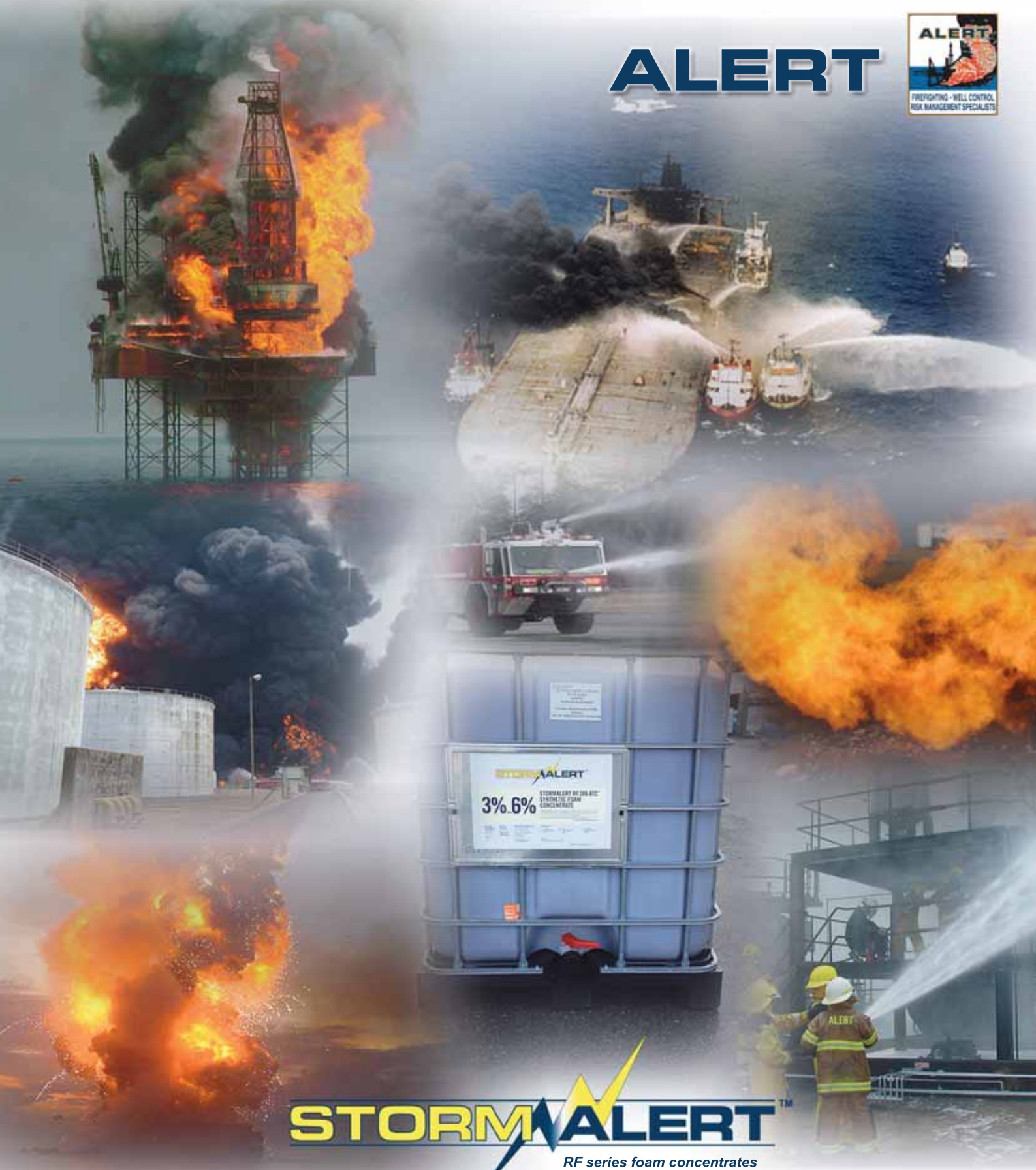
36-38



68-71

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Graham Collins

For Those in Peril

Understandably, most of the firefighting and rescue community's attention is directed towards land-based fires and disasters. Only those located near coastal areas, ports and harbours, or firefighters whose role is dedicated to protecting shipping have maritime firefighting and rescue at the forefront of their mind.

A recent spate of maritime disasters and maritime fires is a timely reminder to us all of the specialist expert skill and knowledge that maritime firefighting and rescue demands. These events also remind those not directly involved that a fire or disaster at sea brings two additional and awesome challenges. Invariably, they are serious events, and hence more life threatening before professional help can be brought to bear. Being surrounded by water also limits significantly the prospect of ever making a timely and swift withdrawal.

Three recent maritime disasters immediately spring to mind, demonstrating that these events come in all shapes and sizes, occur with disturbing regularity and frequency, have widely differing causes, are spread across the world, and present numerous challenges.

sinking of a passenger vessel sailing off the Iranian coast from the island of Hormuz to Bandar Abbas. Most were believed to have been trapped inside the boat or below deck when the boat capsized and sank in bad weather. The boat had apparently run out of fuel before capsizing, and strong wind hampered the rescue effort. An explosion caused a 4000-tonne fuel tanker to sink near Jawol island, off the port of Incheon in north-west South Korea. It left five crew members dead and a further six missing. Local reports suggest that the explosion was likely caused by gases leaking from the ship's oil tanks that had previously been emptied.

Each of these disasters caused substantial loss of life and, in at least one instance, also huge financial loss. However, safeguarding the lives of passengers and crew members and protecting \$ multi-million assets is, in the first instance, not

A fire or disaster at sea is no respecter of departmental budgetary controls, so professional firefighters and rescue personnel must have the right equipment and training in these high-risk and often unfamiliar environments.

Following the recent discovery of two more bodies on the capsized cruise liner, Costa Concordia, resting half-submerged off the Italian island of Giglio, the death toll – at the time of writing – now stands at 15. This seemingly incomprehensible accident occurred in fine weather, the €450 million ship was modern and owned by the world's largest cruise ship operator and to say that land was in sight is a gross understatement. The fact that "human error" is being regularly quoted as the cause of the disaster is undoubtedly inconsequential to those undertaking the rescue operations. What is perhaps more alarming is that the ship is rumoured to have been carrying what is being described as "unregistered passengers", which means that rescuers' lives were put at risk seeking passengers who may not exist.

The death toll stands at nine following the

down to firefighting and rescue personnel. It is firmly and squarely the responsibility of ship owners and operators to ensure the appropriate ship design, construction and maintenance, that adequate firefighting and rescue equipment is on-board and – most importantly – that the crew is properly trained and receives regular re-training.

Inevitably though, professional firefighters and rescue personnel will be needed to bring their expertise to bear, so in these high-risk environments "on the job" training is simply not an option for those managing front-line responders. It is imperative to remember that, while manning, equipment and training budgets are, no doubt, nowadays under constant review, the sea is no respecter of financial controls and is unforgiving for decisions that may put firefighters' and rescuers' lives in unnecessary peril.

IFF



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Wired in a Wireles



Urban Search and Rescue Teams face tremendous physical and emotional challenges when responding to disasters. For this reason alone, the equipment they use must perform in the toughest of circumstances and be reliable in all environments. CON-SPACE Hardline Gear is a USAR team's best choice for rescue operations below ground and in confined spaces – places where wireless communication is not dependable.

When USAR personnel enter a confined space for a rescue operation, maintaining voice contact with the outside world is important. Feelings of claustrophobia, stress or panic can be experienced by even seasoned responders and, while these feelings can be controlled, they can surface very quickly if a problem occurs, with disastrous consequences. Continuous electronic voice communication is one of the best ways to provide responders with a support system when entering a confined space. Hearing a friendly voice allows entrants to maintain an acceptable comfort zone for the duration, while helping to keep feelings of claustrophobia and panic in check.

Some USAR Teams choose to use wireless systems, which can work perfectly well above ground. However, when rescue efforts are required below ground, in a collapsed structure or in a confined space, hard wired systems are much more trustworthy. Wireless equipment does not perform well in many enclosed spaces for a variety of reasons. In these environments, radio communication is subject to dead spots, fading and weak signals. In addition, radios and mobile phones can be extremely hazardous in and around fuel tanks and explosive ordinance, primarily due to Effective Isotropic Radiated Power (EIRP). Another commonly

overlooked aspect of wireless equipment is that radio frequency allocation is becoming more difficult and transmissions over public bands are subject to unwanted, or outside monitoring and/or interruption from other radio users on the same channel or channels.

Portable radios (and some mobiles) operate on a PTT or "push-to-talk" basis, requiring responders to stop what they are doing, or take their hands off what they are doing in order to communicate. To address the PTT issue, some have turned to "hands-free" or "voice activated" (VOX) accessories, however these work reliably only in low-to-medium noise environments. In high noise areas, VOX accessories are plagued by false activation, which triggers the electronic push-to-talk switch and can inadvertently lock a radio into transmit mode, cutting off all communication.

With the previously addressed shortcomings of many wireless communications systems, Con-Space Hardwired communications systems are the best investment for any USAR Team. That is because hardwired systems typically excel in areas where radios fail. Con-Space Hardline gear is:

- Electrically shielded
- Extremely rugged
- Resistant to chemicals
- Environmentally sealed

For more information go to
www.con-space.com

s World

- Water and dust-proof
- Intrinsically safe

At first glance, the biggest drawback of Hardline communication is the cable itself. The major issue being that there is a limitation in terms length of the cable; in addition, the cable can snag or become caught on debris in a collapsed structure. However, it is still more beneficial to have a guaranteed, constant line of continuous communication between the responder and the safety attendant above ground – without the worry of interference, dead spots, or the radiation of potentially dangerous or destructive radio signals.

Full duplex Hardline systems are completely hands-free and provide a dedicated and private network for responders as they are working. During rescue operations where a supplied air breathing apparatus is required, the communication cable can be “piggybacked” onto a breathing air line, making a single umbilical that is easily managed by the entrant. Con-Space’s Hardline Gear provides a secure lifeline between responders and safety attendants, eliminating worry of disconnection or interference.

Accessories for the portable Con-Space Hardline systems include:

- Pass through connectors for chemical suits
- Face mask communication accessories
- High noise headsets
- Alarm options
- Two-way hands free talk boxes

Con-Space Hardline systems can be customised, providing USAR teams with the ability to outfit their crew appropriately and transfer into a range of rescue scenarios. The systems can be used effectively within high noise environments and can be easily put to work alongside any face mask, breathing apparatus or enclosed suit, enabling USAR teams to tailor their gear to best fit their rescue strategy. Some examples of these customisations include:

- Two distinct acoustic couplers. This creates an opportunity to integrate the Hardline system to a telephone or tape recorder, which provides a link to outside personnel, wherever they might be.
- Add an Alarm. When connected to the CSI-2100, the alarm module allows any entrant to initiate a 110db alarm from inside the space and it can also be set off by a safety attendant to call the rescue team.



- Line Management. We offer a complete line of cable reels and coilers to help you manage and store your Hardline cables safely and efficiently.
- Umbilical Covers. Tag airlines and communication cables in one single umbilical for more efficient line management.
- Expansion cable to add an additional command module. Connects two CSI-2100 command modules together for a total of eight users. Add two cable splitters and two double splitters for a total of 14 users. Available for 2100 Module only.

Con-Space Hardline products are intrinsically safe, ruggedly built, waterproof and dust-proof – this permits the rescuer to get his or her job done, without worrying about damaging the equipment. Above all else, the best reason to choose Con-Space’s Hardline Gear is simply due to our track record of providing reliable, durable and proven communication where it is needed. We stand by our products and have engineered them to work whenever and wherever you need them.

Kits for Rescue Operations

All kits provide hands-free, full duplex (simultaneous two-way) private communication between the victim, rescuers and safety attendants. They are designed for rescue operations in confined space, collapsed structures, high angle rescue and trench rescue.

IFF

Function	Rescue Kit 1P	Rescue Kit 3	Rescue Kit 5P	USAR Task Force Kit	Victim Locator Kit Structural Collapse	Bomb Disposal Kit	Mine Rescue
Application	Standard	Basic	Enhanced	Multi-Purpose	Basic	Standard	Basic
Total Number of Users	5	3	6	Multi-User	1	3	3
Number of Entrants	4	2	4	4	–	2	–
Number of Safety Attendants/ Hole Watch	1	1	2	2	1	1	–
Entrant Distance(m)	30.5	30.5	30.5	91.5	7.5	31.5	457

*Additional cable may be added for increased distances up to 457m

Upgraded SCBA Unveiled

AVON PROTECTION has introduced the latest version of its Viking Z Seven SCBA (self-contained breathing apparatus) with the aim of equipping firefighting teams with advanced respiratory protection and communications technology.

The upgraded apparatus has undergone fundamental revisions to its functionality and electronics system. A revised cylinder connection assembly offers a larger cylinder hand wheel for ease of use with gloved hands, together with a luminescent pressure gauge and cylinder band for enhanced visibility in darkened or smoke filled environments.

The Viking Z Seven control console provides an easy-to-use advanced communications system with large push button design for use with gloved hands, and a voice amplification system speaker with ten voice threshold settings that reduce breathing noise. The entire electronics uses one source of power through its C4 power pack with an easier to check back frame location, supported by free battery supply for ten years PASS (Personal Alert Safety System), and all other NFPA required features, including heads-up display and complete CBRN protection.

The apparatus offers integrated communications, with voice amplification as a standard feature, and Air Switch technology incorporated into the facemask to enable immediate switch from ambient to cylinder air when required. An ultrasonic beacon can assist in downed team member location while a tracking device can be mounted to a thermal imager for combination ultrasonic tracking and thermal viewing.

In addition, an integrated air management telemetry system relays vital SCBA information to enable command centres to monitor cylinder pressure, real time temperatures, PASS status and SCBA battery status. A one-button operation can recall either one or the entire firefighting team in an instant.

For more information, go to www.avon-protection.com



Spain Opts for Striker ARFF Vehicles

Aena Aeropuertos S.A. of Madrid, Spain has placed an order for ten "new-generation" OSHKOSH Striker aircraft rescue and firefighting (ARFF) vehicles. The new Striker 6 x 6 models will be placed into service at Madrid Barajas International airport, as well as other major airports throughout the country. Delivery of the vehicles will begin in September 2012 and the contract is valued at over €5 million.

Following what Oshkosh describes as more than three years of extensive development, the new generation Striker delivers "innovative fire suppression technology, unmatched chassis performance, advanced safety systems, unsurpassed reliability and durability, and smart design".

Specific features available on the new Striker include: all wheel independent suspension for smooth ride; 11,356-litre water tank capacity; walk-in engine power pack access through doors on



each side of the engine compartment; low-attack bumper turret with high flow discharge and dry chemical capabilities; and a structural firefighting system with crosslay discharges at both sides of the truck. Other features include: dual-agent swing-out hose reel in a lower compartment; a new cab design with increased glass area for improved driver visibility to all directions; and segregated vehicle, fire suppression and lighting system controls.

Aena Aeropuertos S.A. manages 47 airports and two heliports in Spain and participates directly and indirectly in the management

of 28 more airports around the world. It is the world's leading airport operator in terms of passenger numbers, handling nearly 200 million each year.

For more information, go to www.oshkoshairport.com

Firefighting System Boosts Firefighter Safety

Heralded as a new concept in vehicle-mounted firefighting that has been designed from the ground up to support firefighter safety, SafeBuy has been introduced by HALE and TASK FORCE TIPS.

It is a system of critical fire suppression components that have been pre-engineered to work together to ensure an uninterrupted flow of suppression agent. It comprises the pump house, hoses, monitors, valves, safety devices, diagnostics and plumbing.

The system includes:

Hale Qmax pump; anti-corrosion anodes; gearbox; engine governor; thermal relief valve; manifold system; pre-connected portable monitor; remotely operated, high-volume curb-side intake valve; high-volume remote control monitor; and hand-held nozzles.

For more information, go to www.haleproducts.com or www.tft.com



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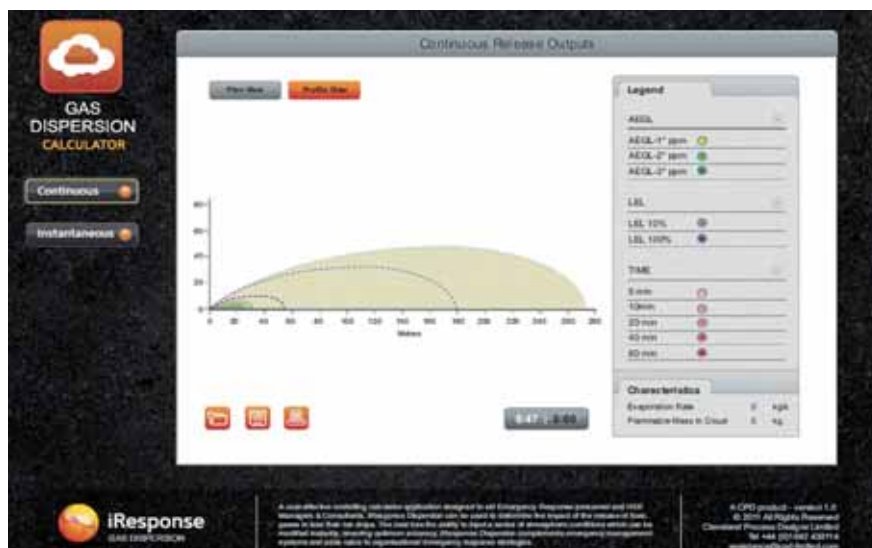
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Emergency Management Modelling Software



A series of modelling applications designed to assist firefighters, HazMat teams and consultants with emergency management has been developed by technology solutions company, CPD.

The company's iResponse is currently utilised in more than twenty countries, and its thermal modelling software, called iResponse Thermal and dispersion modelling software called iResponse Dispersion enables the user to test emergency management plans, evacuation plans and environmental impacts. According to CPD, one of the key benefits of the applications is that users can achieve their modelling in less than ten easy steps, which is an attractive proposition for users.

iResponse Thermal enables modelling of tank fires, jet fires, pool fires and bund fires. Through the input of relevant atmospheric conditions such as wind speed, wind direction and temperature, thermal heat radiation contours are displayed. It also includes a burn-down calculator, providing the length of time a given product will burn until incinerated.

iResponse Dispersion allows the user to follow a similar short sequence, with the result being both plan and profile views of a product as it disperses into the atmosphere, providing the user with distances and area covered by a release. iResponse Dispersion can model instantaneous and continuous releases.

For more information, go to www.cpd-limited.com

New LED Portable Floodlight



The Aurora LED portable floodlight is the latest innovation from NITECH. It is said to utilise the very latest LED and design technology, and address the market's growing hunger for 'green technology'.

What is described as "unique rechargeable technology" has been incorporated into the floodlight to enable users to benefit from carbon-footprint savings, offering an annual CO2 saving of up to 3000kg. At the same time, overall efficiency is claimed to be ten times that of conventional site lighting. The Aurora's maintenance-free battery enables it to operate for 10,000 hours before it needs to be replaced, while the LED light source offers an operating life of 100,000 hours.

The Aurora produces wide-angle, daylight-equivalent light output with shadow-free illumination to suit both task and general lighting applications. Offering cool running, it can be utilised in confined spaces and has an IP68 waterproof rating to suit the demands of exterior environments. It offers multi-voltage rapid recharging from 200 volt to 230 volt AC and from 100 volt to 130 volt AC with other voltages available. These floodlights can also be recharged via a 12 volt vehicle battery. A visual and audible warning provides effective indication of a low battery during operation.

They can be used as a maintained lighting system for emergency applications. When linked to the mains supply or generated power source, they can operate continuously while retaining their full power reserve. Auto switching models are also available.

For more information, go to www.nitech.co.uk

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PPE Scores in Poland

The State Fire Service in Warsaw, Poland is upgrading its protective clothing in readiness for the UEFA (Union of European Football Associations) EURO 2012 that will be held in Poland and Ukraine. The Trellech VPS suits from TRELLEBORG PROTECTIVE PRODUCTS will be distributed to Gdansk, Poznan, Warsaw and Wroclaw where matches will be played, as well as other Polish cities, to play a key role to secure the fire service's counter terrorism capability during the championship. The suits will be the service's standard type 1a (Level A), fully encapsulated chemical protective suit for its first responders.

Trellech VPS suits have full certification to EN 943:2 (edition 2002), and the material and complete suits are also compliant to other standards and regulations. It meets the requirements set out in EN 1073-2 for protection against radioactive particles and those in EN 14126 for protection against bio-hazards/infective agents. It is also fully certified to the stringent US standard NFPA 1991 (edition 2005).



For more information, go to www.trelleborg.com/trellech

Stepping Up



The latest addition to the Quik-Step line of vehicle steps has been introduced by ZIAMATIC – the VS-20-5 Retractable Vehicle Step. It requires only a 600mm wide by 225mm deep mounting surface making it, the manufacturer claims, the ideal choice for tilt cabs and other apparatus with depth limitations such as air filters.

It is made from high strength aluminium alloy and steel to withstand the wear and tear of the fire service, while providing an optimal stepping distance to reduce firefighter fatigue. The VS-20-5 may be wired to the door interlock system to automatically extend when the door is opened and retract when the door is closed.

Powered by a 12V electric actuator, the step features a patented over-centre locking mechanism to hold it rigidly in place when extended. Powder-coated and plated for corrosion resistance, the step features a non-slip stepping surface with a 150mm drop. It sustains a static load of 225 kilograms. The VS-20-5 deploys in under two seconds and may be retrofitted onto existing apparatus.

For more information, go to www.ziamatic.com

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All-new Range of Marine Firefighting Suits Meets New MarED Standards

An all-new range of marine firefighting PPE, designed to meet the recent introduction of upgraded European MarED, has been introduced by BRISTOL UNIFORMS.

Maintaining the traditional yellow outer-layer associated with marine firefighter protective clothing for over 50 years, Bristol's new range of Fleet Suits has been designed to meet BS469:2005 Level 2 and Level 1.

The new garments include coat and trousers, boots, gloves and helmets. They have been independently tested and have Wheelmark Certification to



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meet Marine Equipment Directive (MarED) 96/98/EC. They are available in fabric combinations that meet either Level 2 or Level 1.

The Level 2 garment is a three-layer combination using an HR2YE yellow outer-layer, moisture barrier and an inner thermal barrier quilted to FR cotton. The Level 1 variant is a two-layer composite, similar to the Level 2 option, without the moisture barrier.

New compatible accessories include a yellow flame resistant, high temperature copolymer plastic helmet incorporating a polycarbonate anti-scratch and anti-fog visor (EN443), new blue, heat-resistant leather gloves with knitted wristlet and aramid lining (EN 659) and a vulcanised rubber boot, incorporating a steel toe cap and mid sole (EN 15090).

For more information, go to www.bristoluniforms.co.uk

New Foam-induction Water Monitor complements Range

ANGUS FIRE has launched Polaris, a foam-induction water motor to complement its existing range of foam-making equipment. It is designed to deliver 1%, 3%, 6% or dual-rate foam induction within Underwriters Laboratory (UL), Factory Mutual (FM) and EN standard limits, across a wide range of flows and pressures.

The water motor is driven solely by the extinguishing water flow, requiring no external energy source. The water flow drives a rotor connected to a foam pump, which pumps foam concentrate into the water motor outlet, creating the firefighting water/foam solution. The system is flow-proportional – the higher the water flow, the more foam is inducted, to maintain the correct concentration level.

Major benefits being claimed for Polaris include minimum water and line pressure loss. Foam concentrate can be



supplied from a tank at atmospheric pressure, which can be refilled at any time without any need to interrupt firefighting activities. Polaris is manufactured from high-grade, corrosion-resistant

materials that are compatible with seawater, ensuring that it can be used in a wide range of environments, including offshore and marine installations. Polaris induction motors are designed to match normal water flow through a schedule 40 pipe system, and can be configured for static industrial systems and ring mains, including foam sprinkler systems. A de-mountable, portable version of the unit is available, which

is suitable for use on fire and rescue vehicles.

For more information, go to www.angusfire.co.uk

In-board Emergency Services Keyboard

BYTEC EMBEDDED has launched what it describes as an advanced small-footprint, wireless, USB keyboard for demanding emergency services environments. The IP65-rated Indi-Key keyboard is heralded as offering wipe-clean surfaces, improved key response and feel, a wider touchpad and an optional numeric keypad. It is designed for use where space and reliability is critical, and the wipe-clean Indi-Key has been constructed with a Silver Ion antibacterial agent acting as a secondary defence against the spread of infection and cross contamination.

The wireless dock enables quick replacement of a used keyboard with a newly cleaned one without the need for any user set-up. The ergonomic keyboard features fold-flat keys for fast cleaning and has a lighter feel with a more tactile response, plus the option of an integrated numeric pad for faster data input. It has a typical operating life of six hours, and battery life is further preserved with a 15 minute sleep mode. Three levels of red backlit illumination enable the keys to be visible in all light conditions.

For more information, go to www.bytec.co.uk



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New USAR PPE

A new USAR coat and trouser has been added to BRISTOL UNIFORM'S firefighter PPE range. The new kit features a number of advances on the previous design introduced in 2009.

Incorporating two layers, the new USAR ensemble focuses on comfort, ergonomic fit and composite flexibility for kit intended for use in a variety of technical rescue tasks as well as road and rail accidents. Both coat and trouser feature a flame retardant outer layer over a waterproof membrane, 3M reflective triple trim and incorporate a pathogen barrier. The product meets the requirements of the EN ISO 11612 General Flame standard and is available in orange, high-viz orange, red and navy and in three alternative outer fabric combinations. A choice of Protex Cotton, Nomex Delta C and Kermel is married up to a Gore Crosstech SR moisture barrier.

Features of this latest Bristol offering include a single zip size allowing any girth variations to be mixed when using the facility to zip the coat and trouser together to form a one-piece garment. Coat flexibility comes in the form of vented underarm panels, underarm gussets, a pleated back, quilted padding on the elbows, improved throat protection and weatherproof seal over the front zip. Added comfort is provided in the form of angled pockets with flaps, full breathability through all layers and wrist straps to close sleeve hems over gloves. Comfort and safety features in the trouser include elasticated side waist, ergonomic curved knee shaping and quilted foam padding with Kevlar for protection and a leg gusset with concealed zip.



For more information, go to www.bristoluniforms.co.uk

New Gas Leak Detector

The UltraSonic EX-5 gas leak detector from MSA detects airborne leaks from high-pressure gas systems. A high-precision stainless-steel microphone enables instant detection, while an integrated acoustic self-test provides full failsafe operation. HART and ModBus communication options give complete status and control capability in the control room, and a stainless-steel 316L explosion-proof housing ensures corrosion resistance in harsh environments.



For more information, go to www.msanorthamerica.com



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Kirila Fire Training Facilities, Inc. is located in Brookfield, Ohio and has been a leader in manufacturing and servicing Live Fire Training Facilities for over 15 years. Kirila Fire has provided Fire Training Facilities to several countries world-wide and has plans to continue to market themselves and expand to more locations around the globe.

Kirila Fire is a customer-oriented business that was established to provide a cost effective product and service to the Fire Training Community. Kirila Fire takes pride in their workmanship and their ability to fully warranty the work they perform at each location.

Kirila Fire Trainers include Fixed-Wing Aircraft, Helicopter, Vehicle, Haz-Mat, Industrial and Flash-over Trainers. Its key markets include Airports, Military and Fire Training Schools world-wide.

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Within the company, there are engineers to perform civil, electrical and mechanical designs. Kirila Fire's technicians have the ability to troubleshoot and access all types of existing facilities and develop a solution to repair them per the Original Equipment Manufacturer (OEM) or modify the fire training apparatus to the specific needs of the end user. Furthermore, Kirila Fire has the ability to fabricate many of the Fire Training Facility components and the ability of clearing trees, site excavation, infrastructure



improvements, installation of training apparatus and providing training of the facilities.

Kirila Fire is a well diversified organization because it has the ability to bridge the gap between owners, designers, manufacturers, installers and end users. This allows them to rely only on themselves and expedites the construction critical path method.

Kirila Fire Trainers are constructed, maintained and operated in accordance with the requirements of the National Fire Protection Association (NFPA), Occupational Safety and Health Act (OSHA) and the Department of Defense (DoD). Safety is primary when considering the development of fire training scenarios, as well as the modification and maintenance of the facilities.

Kirila Fire has successfully designed and built both propane liquid fossil fueled facilities. The training fires developed provide nonstop thermal contact and pure exposure, giving the firefighting trainee and the training system(s) exercise that tests the limits of controlled and out of control fires.

Kirila Fire can build live fire training scenarios in a real-like atmosphere per NFPA standards when they are still safe to use. JP8

and propane are the fuels used for the fire scenarios.

In regards to maintenance and on-call services, time is of the essence. Kirila Fire has a skilled team of technicians that travel around the world to provide dependable and trustworthy service to their customers. The technicians specialize in Fire Training Facilities and are familiar with the



National and International Standards associated with Fire training systems and the procedures for performing various fire training scenarios. These teams travel to the end user's site with truck and trailer rigs that are fully stocked with equipment, parts and tools to service these types of facilities. **IFF**

Kirila Fire is a well diversified organization because it has the ability to bridge the gap between owners, designers, manufacturers, installers and end users. This allows them to rely only on themselves and expedites the construction critical path method.



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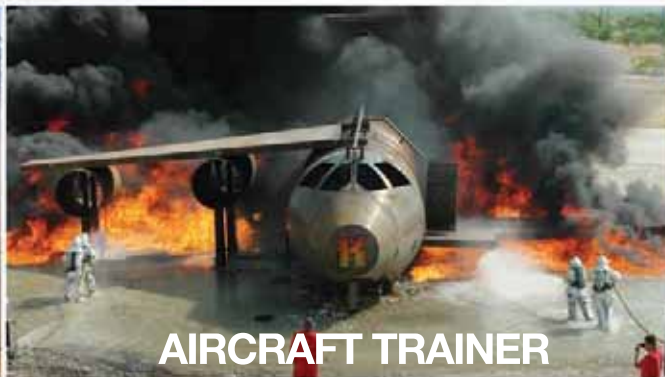
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Jessica King

Devon & Somerset Fire
& Rescue Service

Confined Space Training

The Training Academy at Devon & Somerset Fire & Rescue Service launched in November 2010 and is now one of the leading fire & rescue training providers in the UK. It offers training solutions to internal staff, commercial organisations, individuals, fire and rescue services and other emergency services personnel.

The Academy comprises eight different schools including access and rescue, fire behaviour, maritime, firefighter training, command training, fire safety, driver training and first aid.

The Access & Rescue School offers courses in confined space, working at height, technical water rescue, rope rescue and animal rescue. In particular, the Academy has recently seen a growing demand for confined space training. A confined space course being vital for those that are required to work in restricted or cramped spaces; the training builds the student's knowledge and understanding of the hazards and risks involved, allowing them to work safely within confined spaces. Confined space training is a statutory requirement in the UK, outlined in the Health and Safety at Work Act 1974 and the Confined Space Regulations 1997. Within those regulations it states that workers should be competent in the entry and exit and safe working within confined

spaces and to have knowledge of the hazards and risks involved. The water authorities have been very proactive by creating their national occupational standards; as a result a number of organisations outside of the water authorities are now ensuring that any sub-contractors or contractors working on their premises will also complete this training to the same standard.

The Academy offers a one day confined space awareness course involving a mixture of theoretical instruction, which is undertaken for legislation purposes, and includes gaining an understanding of hazards and risks, risk assessments, permits to work, method statements and a safe systems of work. This course also includes a good blend of practical demonstrations and exercises, such as equipment familiarisation, and teaches delegates how to inspect harnesses prior to use, inspect hard hats and any other equipment that they may be required to use. Students are then shown how to



safely enter and exit a confined space and will receive a workbook that they will complete during exercises and will finally finish off with a summative assessment.

Delegates will receive a certificate upon successfully completing the one-day course, which is valid for three years. The Academy offers a total care package that includes notifying customers six months before any refresher training is due. Those that successfully complete the one-day course can choose to add an extra day to the course to learn about confined space with breathing apparatus.

Devon & Somerset Fire & Rescue Service also ensures that internal staff receive quality training, which allows the Academy to supply this training to other fire and rescue services and emergency services personnel both nationally and internationally. Each Academy instructor is experienced within his or her field of training; they are all qualified adult teachers and require a permit to teach from the organisation that ensures that the highest standards are met. Mark Shaddick, Lead Instructor at the Access &

Rescue School says: "We believe in being interactive with the delegates that attend our courses and we aim to embed the functional skills in all of our learners".

As well as confined space awareness, the Academy offers the 6150-02 two-day City & Guilds Medium Risk Confined Space Course. City & Guilds is the UK's leading provider of vocational qualifications and its suite of 6150 qualifications are the water industry standard. The medium risk course is designed to provide delegates with the knowledge, confidence and skills to enter, exit and work safely within medium risk confined spaces, and students are taught how to conduct risk assessments, fill out and use permits to work and understand safe systems of work. This course is in line with the National Occupational Standards (NOS) for working in confined spaces (NC1, NC2 and NC3). Mark Shaddick comments: "We want to do all we can to ensure we offer the highest possible quality training. Not only do City & Guilds verify our courses externally, we have enlisted QA Associates to internally verify us and make certain that we maintain the standard that allows us to be a City & Guilds accredited training provider".

The most recent two-day medium risk confined space course provided training to the Devon & Cornwall Police Dive Team. Anthony Shergold who is part of the dive team comments: "Having attended other venues this course was far superior in all aspects, excellent instruction and balance of theory and practical content". Included within the course is instruction on how to test, maintain and care for the equipment. Mark Shaddick adds: "The equipment that we use has been purchased to match the City & Guilds standard and the standard that is required to work safely in confined spaces. As well as offering delegates equipment instructions we have devised our own equipment care packages including a pocket-size confined space aide memoir for students to use as a reference tool once the course is over". At the end of the two-day course all successful delegates will receive a City & Guilds 6150-02 certificate in working in medium risk confined spaces and a site card, which is valid for three years.



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The Access & Rescue School has recently received excellent feedback from the City & Guilds verifier to offer the full suite of its 6150 courses, including 6150-02 medium risk and 6150-03 high risk, as well as the 6150-04, 6150-05 and 6150-06 topman/non-entrant supervisor awards. Mark Shaddick says: "Obtaining the full suite of courses through City & Guilds gives us a fantastic opportunity to provide quality training to local businesses in the South West of England and beyond". City & Guilds clarifies who the suite of courses are aimed at: "These qualifications are for anyone working in confined spaces, whether it is the classification of confined spaces, entering and exiting, overseeing or emergency rescue and recovery". City & Guilds asserts that its 6150 qualifications are: "Linked directly to National Occupational Standards that are supported by the Health and Safety Executive, this suite of qualifications is the new national standard for working in confined spaces and is accredited on the national framework".

The Access & Rescue School, based at the Fire Service Headquarters in Exeter, Devon has its own purpose-built confined space facilities that replicate real life confined space scenarios. Delegates will also have the chance to learn with the most advanced equipment. Mark Shaddick adds: "We have made considerable investments in our facilities and equipment and we have a stand-alone purpose-built building with a number of practical areas, each offering a different work-based scenario. We wanted to ensure that our facilities and equipment matched the quality of our training". As well as practical training facilities the Academy offers a complete training package, including a purpose built lecture room, shower and changing facilities and on site catering.

The school offers bespoke training to adapt to the individual needs of organisations. Confined space courses are run in Exeter, however Training Academy instructors are able to visit a customer's place of work and conduct a risk assessment in order to tailor a course to suit the individual requirements of the company. For example, late last year over 25 members of the Balfour Beatty Utility Solutions South West Water Team completed a medium risk confined space course that was tailored to match their training needs. Operations Manager, Dave Raw observes: "The fire service is well known for the quality of training it delivers to its own workforce, so it was a fantastic opportunity for us to take advantage of its skills, experience and training facilities. The fact that the course was tailored specifically for the waste water industry made it even better."

By supplying training to commercial organisations, the Academy is helping to improve public safety and reduce risk in the workplace, while passing on the knowledge and understanding of fire service operational tactics at confined space incidents. Mark Shaddick comments: "We are able to train people to identify hazards within their industry-specific environments and put into place appropriate control measures to reduce the risk and most importantly equip them with the knowledge of what to do if things go wrong".

The Academy is continually growing and expanding courses to meet the training needs of commercial organisations, other fire and rescue services and emergency services. Mark Shaddick concludes: "It is encouraging to hear such positive feedback from the companies that we train and we will continue to develop our courses and offer quality training and facilities".

IFF

Jessica King is the Training Academy Project Support Officer at Devon & Somerset Fire & Rescue Service

For further information, go to www.dsfire.gov.uk

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Graham Collins

Monitoring Ahead

The use of monitors is becoming ever more sophisticated, as the latest thinking and offerings from the market leaders shows.

Akron Brass introduce new models

AKRON BRASS COMPANY has introduced several new monitor products over the past year. The Style 3430 GP Manual Monitor is claimed to be the smallest and most economical 3800 litres-a-minute monitor found worldwide. Manufactured from high strength Pyrolite, it includes a "T"-shaped control handle, integrated high performance stream shaper, and pressure gauge. It is available with either a 75mm ASA or DN80 inlet flange.

The Style 3462 Electric Forestry Monitor from Akron is the newest addition to the electric remote control monitor product line. This 1140 litres-a-minute monitor is the first monitor from Akron Brass to feature an integrated, on board control system. The completely sealed control system makes installation "a snap" by using engineered harnesses with IP67 rated connectors. The system communicates with the control components using the J1939 CAN communications protocol standard, which is widely used in the fire apparatus industry. Coupled with high speed motors and proportional speed joystick, the 3462 provides

the precise stream control and a robust platform for wildland firefighting vehicles.



At the other end of the spectrum is the Style 3356 Trident High Flow Monitor. The Trident delivers up to 7600 litres-a-minute with a reach of over 90 metres down range. The Trident has 355 degree rotation and +70/-30 elevation range. This, says Akron, makes the Trident an excellent choice for the demanding aircraft rescue and fire fighting (ARFF) vehicle market.

The Trident platform can use standard Akromatic nozzles or integrated dual flow aspirated and non-aspirated foam nozzles, and has what is described as an advanced feature set that includes oscillation with dynamic limit adjustments, one touch stow and deploy, and obstacle avoidance. It utilises the new Universal II control system to provide ease of installation with just two connectors needed. One connector is provided for the monitor

and the other for the vehicle interface.

The Universal II control uses the industry standard J1939 CAN protocol to communicate with the peripheral control devices such as joysticks, direction indicators, and wireless controllers. It





can provide up to five channels of motor control for the most demanding applications, and basic diagnostics codes directly to the user or advanced diagnostics and programming using the AkroView diagnostics software package.

The Style 3531 Oscillating Flange is the newest product in the industrial category. The 3531 can be used with various manual industrial monitor products to provide a wide protection range using only the water flowing through the device to execute the horizontal oscillation movement. It has been designed to protect some of the world's most valuable assets, and boasts a unique, maintenance-free polymer bearing design that eliminates the problems with traditional ball-bearing based devices in continuous use applications. The maximum sweep range of 65 degrees enables this unit to be used in hangar protection of aircraft. The 3531 is capable of flowing 4800 litres-a-minute at 250 psi (17bar) or 6000 litres-a-minute at 180 psi (12.5bar). It includes a speed control valve and a test port so that the unit can be setup and maintained without turning on full flow to the device.

For more information, go to www.akronbrass.com

Unifire Upgrade and expand systems

UNIFIRE AB of Sweden has recently upgraded and expanded its suite of electronic control systems for its popular Force series remote control, water/foam monitors for fixed firefighting applications.

Thanks to these latest developments of both electronic hardware and software, Unifire now claims to be capable of rapidly deploying powerful, customised, fully networked monitor systems that can work with almost any third-party, electronic peripheral device. These systems are individually designed to meet each client's functionality requirements.

According to Unifire's Director of International Sales & Marketing, Roger Barrett James: "Unifire constant development of the many advanced fire suppression systems we design for our clients has particularly been spurred by our clients' requests for semiautomatic and fully automatic fire detection and suppression systems, which combine our Force monitors and any of a variety of fire and flame detection technologies, valves, cameras, display screens and joysticks. With the introduction of our latest developments in our suite of electronics hardware and software, we can now easily and quickly design and deploy fully networked firefighting systems that combine virtually any electronic device on the market, regardless of its communication protocol."

Unifire's networked systems are reckoned to offer a number of competitive advantages for fixed installations with multiple monitors. They are highly flexible and customisable, very quick to design and implement, and they are extraordinarily easy to troubleshoot,



expand, service and upgrade. They use Unifire's off-the-shelf hardware and software, circumventing the time, expense and complications involved when utilising third-party control systems.

Among the hardware devices that make this possible is the Unifire Control System. This device is a PLC (programmable logic controller), which serves various functions in the network. The UCS allows for a large number of inputs and outputs, and it routes network communications. It also has a built-in display screen and a user interface, allowing technicians to troubleshoot, view system data and performance, adjust settings, and more.

The UCS units allow Unifire to create networks in many configurations to serve almost any function and layout desired. Programming all system functions is simple and straight forward. Adding and/or changing functions in a system is achieved simply by adding new nodes and/or updating system software. Unifire's systems can now, via off-the-shelf USB flash drives, accept software and even firmware upgrades. They can even record all network activity onto USB flash drives for instant analysis.

Some of the many applications include: automatic fire suppression systems, such as those comprising Force monitors, fire detectors, cameras, alarms, valves and remote controls; remote control systems in which multiple monitors are controlled from one or more control panels and/or radios; and more traditional installations of a single monitor that also requires the control of valves, lights, switches, monitors, and similar peripherals devices.

For more information, go to www.unifire.com



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Task Force Tips Remote Controlled Future

According to TASK FORCE TIPS, the development of standards over the years has created some great recommendations for firefighter safety and survivability. Several recommend that “where possible” all steps be taken in the design of the apparatus to “reduce the need of the firefighter to climb on to or operate from the top of the apparatus”. This includes the suggested use of powered equipment racks, bringing attack lines lower on the apparatus so they are easier to pull and repack, providing for the checking of apparatus fluid levels from ground level, and one item that especially catches the eye of anyone involved in fire streams management – the use of a remote controlled deluge monitor.

So, the question remains: is the day of the firefighter standing and using a deck gun from the top of the truck over?

It may be if current standards and workplace safety guidelines are adhered to. It also may be if fire suppression agencies see the continued need for this typically defensive tool, and rural agencies with water supply challenges understand the tactical capabilities it can provide. Additionally, acceptance of these apparatus components continues to grow as manufacturers such as Task Force Tips work to solve problems that have long plagued competitive legacy designs.

- Today reliability of electrical components (wiring, connectors, chip boards, and electrical interfaces) is excellent. Even in harsh fire ground conditions.
- Apparatus manufacturers continue to simplify installation procedures with support from TFT Service Team members who work hand in hand with installers.
- Electric motors and components are more dependable and have been “hardened” for the rugged environment.
- The size and weight of components continue to be reduced allowing for more elegant and efficient installations.
- Poor stream performance, excessive friction loss and internal stream turbulence that once plagued competitive models have now been eliminated with new computational fluid dynamics software programs.
- Field service and warranty issues are now managed effectively with 24-hour telephone and on-line technical service and support.

While there is still an expectation to see a mix of manual, as well as remote controlled, monitors on new apparatus deliveries, we also will find firefighters crawling across the top of trucks to use



deck guns, pack hose, and retrieve equipment. So, what does the future hold? The answer is a mix of manual and remote controlled monitors being specified and installed and current remote controlled monitor producer continuing to improve designs, durability and performance. Fire departments with limited

staffing that have chosen remote control monitors will also continue to specify the use of new lightweight portable monitors, such as TFT's Blitzfire and Crossfire, more and more for their heavy stream applications.

For more information, go to www.tft.com

Silvani monitors New Offering in Australia

SILVANI firefighting monitors, claimed to be one of the world's largest ranges and configurations, are now distributed in Australia by Kidde Australia.

Models are available to suit the smallest to the largest of fire-fighting needs with models available to meet flows of between 1800 litres-a-minute and 60,000 litres-a-minute, and materials include carbon steel, stainless steel, bronze and light aluminium alloy. Hydraulic, electrical and hydro/electric remote control options are available on all Silvani monitors together with a wide range of single and multi-way control panels. Remote control panels for use in areas where explosive regulations apply are also available. A wide range of fog/jet nozzles, foam cannons and self-inducing nozzles and cannons is also available.

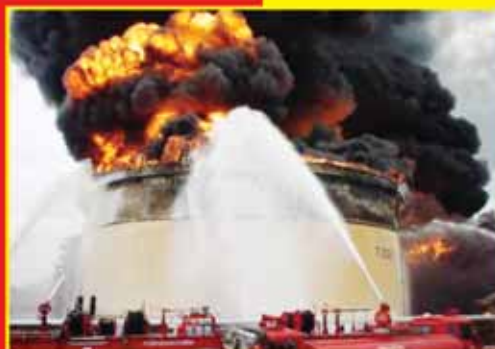
Silvani monitors are designed to optimise the performance of Angus Fire foams, also distributed in Australia by Kidde Australia, maximising throw and flow without reducing foam quality. Modern FP or AR-FFFP protein-based foams are preferred since they enhance the throw of the jet and minimise dropout and wastage. They also minimise fuel pick up from forceful plunging and provide superior burn-back resistance with longer post fire security.

For more information, go to www.kiddeitaly.com



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Evaluating and Implementing PPV



Leroy Coffman

Tempest Technology
Corporation

Positive Pressure Ventilation (PPV) is a firefighting tactic that involves the use of high-powered ventilation fans to remove smoke, heat and gases from burning structures, thereby enhancing safety for first responders. There are many considerations when deciding whether PPV is right for your fire brigade and how it will be integrated into existing tactical operations.

Positive Pressure Ventilation works on the principle that air will always flow from an area of high pressure towards an area of low pressure. To apply PPV, a gasoline or electric powered fan is positioned in front of the firefighters' access point in order to force fresh air into the structure (the high pressure point). At the same time, an exhaust opening is created where the smoke and heat are to be exhausted (the low pressure point). The air pressure created by the fan forces the air in the structure towards the exhaust opening, taking smoke and heat with it. The resulting improved visibility and reduced interior temperature make it easier and safer for firefighters to enter the structure. PPV is most often applied after the fire has been extinguished, but it can also be applied prior to extinguishment with a technique called Positive Pressure Attack (PPA).

PPV and Firefighter Safety

Positive pressure ventilation is first and foremost a tool to enhance safety for firefighters and other

first responders. It gives firefighting personnel a greater level of control over a hazardous or dangerous interior environment. During fire suppression activities, PPV can dramatically improve visibility inside the structure, making it easier for firefighters to conduct search and rescue operations and locate the seat of the fire. PPV can also dramatically reduce interior temperatures, making it easier for firefighters to move within the structure and reduce the chance of flashover. Opponents of positive pressure ventilation will claim that PPV can intensify a fire by introducing fresh air, thereby making the situation more hazardous. In fact, PPV is not adding any more 21% oxygen than already exists in the interior environment and it rapidly reduces the interior temperature while removing the unburned particles of combustion. Smoke will become fuel when the temperature is high enough and PPV limits the fire's ability to reach the temperature at which smoke will ignite.

One of the most significant benefits that PPV offers firefighters is added protection from the

carcinogens in smoke. Many of the contents in a modern structure fire are made of synthetic and petroleum-based materials. The gases that are emitted when these materials burn pose serious health risks to firefighters over the course of their careers. By applying positive pressure ventilation after the fire has been extinguished and during the overhaul phase, firefighters can achieve an added layer of protection from the gases that linger after the fire has been extinguished.

a live fire training exercise. Many firefighter training academies offer a section on positive pressure ventilation. It will involve a day of classroom training on PPV concepts and hands-on training in a burn tower or fire simulator.

Demand for PPV training has prompted a number of instructor groups to begin conducting on-site training for a fee. These instructors will travel to the fire brigade's training facility to conduct both classroom and hands-on training for all

Positive pressure ventilation is first and foremost a tool to enhance safety for firefighters and other first responders. It gives firefighting personnel a greater level of control over a hazardous or dangerous interior environment.

Availability of Positive Pressure Training

For positive pressure ventilation to be implemented safely and effectively, every person on the fire ground must understand how PPV will be implemented and the role that they will play in the operation. Without a coordinated ventilation operation, PPV cannot be applied safely and effectively. To accomplish this, all personnel should go through a positive pressure ventilation training course that includes hands-on experience with a PPV blower. It is important that this training course includes some type of live fire exercise. The best way for a student to clearly understand the positive impact that PPV can have is to experience it during

incident commanders and firefighters. Once they have concluded their classroom training, every student will have the opportunity to practice implementing positive pressure ventilation in a highly realistic environment. One training group in the United States will even provide the construction plans for a 150 square meter burn building that simulates a typical American single-family dwelling.

PPV Equipment

There are numerous manufacturers of PPV equipment and all offer products that have similar features, functions and performance. A typical positive pressure ventilation fan (also referred to as

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a blower) consists of a 450mm diameter fan blade, a gasoline or electric motor, and a fan shroud to protect personnel from the spinning fan blade. All of these components are mounted to a metal cart that allows the PPV fan to be rolled by one firefighter to the appropriate ventilation point.

Most PPV fans are small enough to fit inside a standard vehicle compartment. Other tools for PPV include large vehicle-mounted fans that are used to ventilate very large structures. These large fans have 1250mm or 1500mm diameter fan blades and can generate up to 255,000 cubic meters of air an hour. When evaluating which positive pressure ventilation tool to purchase, it is important to consider the compartment size of your vehicle, the types of structures you will be ventilating, and whether you prefer gasoline or electric powered blowers.

Compartment Size

Compartment size can be one of the most important considerations when purchasing a PPV blower. Today's fire brigades are called on to perform services far beyond basic firefighting. The equipment that is required for fire suppression, EMS, rescue and Hazmat response makes compartment space on a fire apparatus valuable and scarce. This issue encourages fire departments to purchase the smallest PPV blower they can find. While a 400mm blower might meet a fire brigade's compartment space limitations, it can put limitations on the effectiveness of PPV due to the smaller air pattern and reduced CFM relative to a 450mm or 530mm blower. A good rule of thumb is to purchase the largest blower that will fit into your available compartment space. Most fire departments will try to make space on their apparatus for a 530mm blower and will settle for a 450mm size when necessary.

Type of Structure

It is important consider the types of structures you will be ventilating and choose the type of PPV blower that is best suited to your environment. If your community has many smaller single-family

residences of 100 to 200 square meters, a 450mm or 530mm blower will be adequate. If your fire brigade protects commercial structures that range from 300 to 700 square meters, a larger PPV blower such as a 600mm or 680mm will be more desirable. If your fire brigade encounters incidents involving large commercial structures or high-rise buildings, it may be beneficial to have a large mobile fan of 1250mm or 1500mm diameter. In situations where a large structure must be ventilated with smaller PPV blowers, it is possible to use multiple blowers to achieve greater air volume and therefore adequate ventilation of smoke, heat and gases.

Gasoline or Electric Power

When deciding whether to purchase gasoline or electric powered blowers, the user should consider how they will implement PPV and their access to electric power. If a blower is being used for fire

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attack (before fire extinguishment), a gasoline blower can be setup in much less time and will provide better airflow performance. If a blower is being used during fire overhaul (after fire extinguishment), an electric blower will introduce less carbon monoxide into the building and will generate less noise on the fire ground.

A note on the performance of electric PPV blowers. The first positive pressure ventilation blowers were gasoline powered due to the amount of air volume required for PPV to work effectively. In recent years, new developments in electric motor technology have greatly improved the power and performance of electric PPV blowers. Inverter drives allow motors up to 1.5kW to operate on a 20amp circuit and generate airflow performance that is 60% to 70% of a comparably sized gasoline powered blower. When purchasing an electric blower, it is important to consider the generator power required to operate the PPV blower in addition to all the other equipment on your vehicle.

PPV Airflow Ratings

The airflow performance of a positive pressure ventilation fan is an important consideration for users of PPV. Blower performance is measured in cubic meters per hour ($m^3/hr.$) or cubic feet per minute (CFM) and there are many methods for measuring the performance of a PPV fan. It is common to see the performance ratings for a 400mm PPV fan vary widely from one manufacturer to the next. For example, one manufacturer may claim that its 400mm blower with 4.1kW engine generates 43,100 $m^3/hr.$ (25,350 CFM) and another claims that its blower with the same sized engine and blade generates 26,300 $m^3/hr.$ (15,500 CFM). All 400mm fans with 4.2kW engines will move approximately the same amount of air. It is the way that the airflow performance is measured that will result in wide differences between the published numbers. It is important to compare airflow performance using the same test method. Many manufacturers are using a performance standard established by the Air Movement Control Association (www.amca.org) and this has proven to be a good relative measure of PPV fan performance. Some manufacturers claim that their products are AMCA tested and certified but they

have no affiliation with AMCA. It is important to verify a manufacturer's association with AMCA before accepting its AMCA airflow numbers.

Positive Pressure Attack

Positive pressure ventilation began as a tool to assist with removing smoke and gases after the fire has been extinguished. As the understanding of the physics of positive pressure ventilation has evolved, it is being applied in new ways and for new purposes. The most dramatic development in PPV tactics has been its use for positive pressure attack (PPA), which refers to the use of PPV blowers during the initial phase of fire attack.

After size-up, firefighters will determine whether PPA is an appropriate tactic to use. A PPV blower is positioned at the point where firefighters will enter the structure and a firefighter is stationed at the point where the internal gases will be exhausted. When firefighters are ready to begin PPA, the exhaust opening is created by opening or breaking a window or opening a door. As soon as the exhaust opening is created, the PPV blower is started and the air pattern is aimed into the entrance opening. Once positive pressure ventilation has started, the firefighters wait up to 30 seconds for conditions inside the structure to be improving.

The most obvious indication of improving conditions is improved visibility inside the structure. Almost immediately after the PPV blower is started, visibility inside the structure will improve, allowing firefighters to see a clear path of access to the interior of the structure. Positive pressure attack allows firefighters to begin controlling the environment inside the structure before they enter it and allows them to begin reducing the interior temperature and improving visibility at the moment they begin their fire attack.

Final Words

Positive pressure ventilation (PPV) and positive pressure attack (PPA) are not for every firefighting situation and should never be attempted until all personnel on the fire ground have been trained on proper tactics and techniques. Access to PPV training materials and resources can be sourced via www.positivepressureattack.com and www.positivepressureventilation.com. **IFF**

Leroy Coffman is President of Tempest Technology Corporation

For further information, go to www.tempest-edge.com

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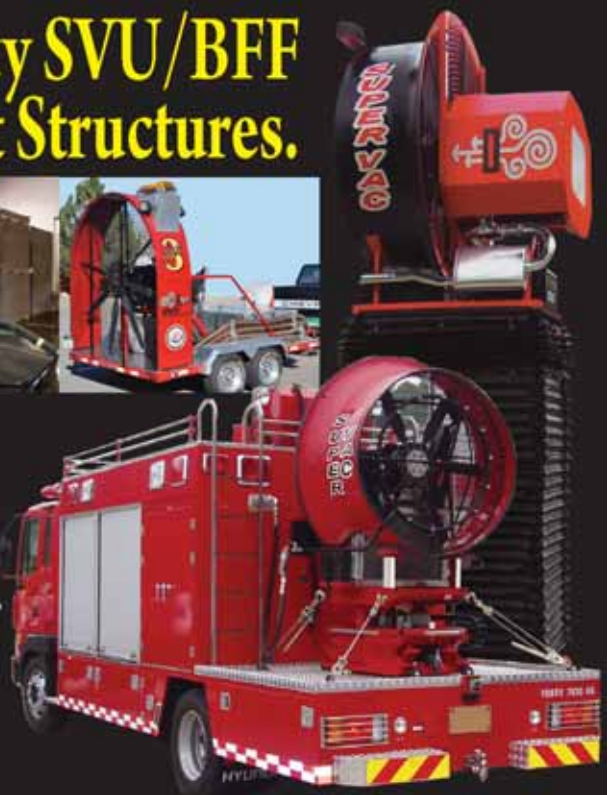
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Fundamentals of V



Axel Topp

Nuremberg Fire Brigade



This article describes briefly the fundamentals of rescue practice from on-scene arrival to freeing the trapped patient and handover to the emergency medical services.

Having arrived at the rescue scene and started to and set up, it is important not to hinder the quick arrival and exit path of emergency medical services personnel tasked with immediate transportation of a patient.

Safeguarding of the scene has to be organised taking into account the traffic situation and road type. In a position forward of the rescue scene, a large vehicle can be positioned to act as a buffer. The fire truck with the necessary rescue equipment should be located close to the crashed vehicle to minimise the travel distance for accessing equipment.

Another important point to remember is the so-called "space management". A perimeter should be established at the rescue scene with its boundary clearly marked. Within this perimeter there should only be essential personnel who are there to perform their duties on the accident vehicle. The staging area should offer the possibility to pre-position equipment and tool that are likely to be needed when working on the accident vehicle. A further staging area in the rear should be reserved for emergency medical services, where spine boards and other medical equipment can be positioned. A third staging area can be used for removed vehicle parts, located away from the accident scene.

Inspection

One of the first phases of the rescue operation is

the vehicle inspection. The team leader and an assistant will examine the situation at the vehicle, looking for:

- First access possibilities.
- What is the patient's condition?
- Can doors and trunk be opened?
- A first opportunity to communicate with the patient. This contact should be kept up during the whole rescue operation.

Additionally, a visual inspection underneath the vehicle is done to determine if fuel is leaking, or if there are any hints for alternative power sources built into the vehicle base, such as gas bottles. At the same time, particular kinds of glass, such as tempered or laminated safety glass, should be marked as later this will play an important role in terms of glass management.

Now we take a look at the inside the vehicle to determine what kinds of safety features can be identified? Is there one or more other person to be extricated?

Fire Prevention

Fire prevention should be undertaken early on. This can be accomplished most effectively with dry chemical extinguishers and a fire hose with a Class B foam additive. Fire prevention must be constantly monitored in case a potential fire hazard develops. Also, in instances where there is a gasoline or diesel leak, Class B foam will be sufficient to saturate these materials.

Vehicle Extrication

Stabilisation

Another safety consideration is supporting the vehicle to keep it from rolling. This is done by ensuring that a wedge or wheel chock is placed behind the tires. The vehicle is secured diagonally, front and rear. After this, the vehicle is stabilised in four places beneath the A and B pillars to prevent movement of the car body, using wedges and square-cut boards. When adopting these measures it is obviously important to ensure that the ground is hard enough to provide a strong and stable base.

When working on the bracing, try to avoid vibration. Any jarring of the vehicle incurs undue physical and psychological stress for the patient, and unused stabilisation materials should be removed from the staging area. Once the four pillar points are secured, air is let out of the tires. The best tool for this is a valve wrench, so that the vehicle can still be rolled later on.

Primary Access

During the patient care activities, it is essential that access to the patient is provided. The ideal way to accomplish this is via the rear trunk in order to circumvent non-deployed safety devices such as airbags. The primary access can be chosen during the glass management operations. Tempered safety glass is taped up so that shards of glass enter the interior as little as possible, as they could cause injury later. Now the glass can be centre punched to break the window.

Initial access to the patient should be fast so that baseline vitals are obtained and documented. A decision has to be made on the kind of rescue: non-critical; critical; or "crash". The patient is covered with a blanket and treated psychologically and physically. Side windows need to be opened. The window sill is then taped up to ensure that glass shards eventually do not get in the way when the door is removed later on. It is important that the patient remains covered and communication is on-going.

Glass Management

In case the glass is wet, a protective cover can be used to remove it in one piece. The responder holds the stretched blanket against the glass from inside while two colleagues grip the bottom edge so that it is tight.

The front windshield is made of laminated safety glass; it can be glued in or framed in by rubber. Removal of the front windshield begins with punching a hole in the glass and cutting it with a glass saw. Laminated glass causes a lot of glass dust; be careful not to inhale it. In consideration for the responder's own health safety, when removing glass, always wear a dust mask; this also applies for the responder working inside the vehicle. If the patient is not already wearing an oxygen mask, he or she also needs to be equipped with a dust mask.

Glass can be taken out as a whole or bent into a U form. The choice depends on medical priorities. When time is a critical factor in the rescue,

glass is folded. If more space is needed due to medical care requirements, the glass needs to be removed completely.

The Airbag Rule

During a rescue operation, there is a high possibility that non-deployed airbags could be harmful. Keeping the airbag acronym, the so-called "Airbag Rule", in the back of our minds will increase our own safety.

A – I – R – B – A – G

A – Always keep a distance:

- Pay special attention to the 30 – 60 – 90 airbag risk zone rule.
- 30cm for head/door and side airbags.
- 60cm for driver airbag.
- 90cm for passenger airbag.

These are the airbag risk zones that we should keep away from and where rescue tools should not be used as unintentionally deploying airbags can convert them into a dangerous projectile. The use of air-bag-safes reduces the risk caused by late deploying air bags. Sometimes, working in the airbag risk zone cannot be avoided; however, time spent there should be kept to a minimum whenever possible.

I – Inspect the vehicle inside:

- A thorough inspection of the inside gives the chief responder an impression of components installed inside the car.

R – Relate the danger to other rescue personnel:

- As well as the fire and rescue team, other emergency medical service teams and the



police will be present. They all need to be warned of on-scene dangers.

B – Batteries need to be disconnected.

- Whenever possible, disconnect batteries. Keep in mind that new cars models may have more than one battery on-board.

A – Attempt to disconnect the interior panels:

- Disconnecting the interior plastic panels will expose airbag unit locations and seatbelt pretensioner locations to ensure these components will not be cut.

G – Getting around dangerous components:

- Even deployed airbags can still be dangerous.
- A not completely deployed two-step airbag or a hot airbag inflator could be a risk.
- The deployed airbag textile material poses no threat.

Interior Plastic Panels

Inspection of pillars and assessing whether hybrid or cold gas generators are hidden behind the panels requires removal of the panels on pillars A, B, and C. It does not matter if the panels are dismantled on one or both sides, since the vehicle is constructed symmetrically.

With regard to the B pillar, it should be noted that all plastic panels extending to the floor of the vehicle need to be removed. Should there be difficulties dismantling interior panels, they can be lifted up to find out if hybrid gas generators, structural pillar enhancements, or adjustable seat belts are present.

Roof Removal

Mark out the appropriate spots where hybrid gas generators, structural pillar enhancements, and seat belt systems are located when attempting to completely remove the roof. By marking out where to cut – the so-called rescue plan execution – work for the cutting crew is made easier. The same work is done on both sides of the vehicle.

Batteries

The battery must be disconnected early on by initially taking a look under the hood of the vehicle. From outside one could dismantle the grill and pull the hood release cable. If this is not possible a spreader can be used to open the hood or other vehicle parts. If the batteries cannot be found, do not waste time for an extended search!

Handling Rescue Tools

We are coming to the “therapeutic opening”; in other words, an opening in the vehicle to provide immediate medical care to the patient. Gaining “therapeutic access” calls for hydraulic rescue tools.

When handling such tools there are a few things to be aware of. Operating hydraulic rescue cutters from the arm bend on an elevated part of the vehicle makes the job easier. Furthermore, it is important that, whenever possible, hinges are cut from the top and that the operator doing the cutting is not positioned between the vehicle and the rescue tool. Above all, it is important to keep a clean work area and return all rescue tools back to the staging area if they are not in use.

Door Removal/Therapeutic Access (Reaching the Patient)

Removing a door by cutting off the hinges requires

enlarging the gap. This is accomplished using a spreader to expose the hinges. One possibility is to perform a fender crush.

Now the door hinges are separated with a rescue cutter or spreader. Be aware when cutting, that the door latch mechanism is kept open. Keep the star grip valve “open” until the second pressure stage is reached. This means that movement of the blades or spreader arms will slow down. Only in this pressure stage does the tool apply its maximum performance. Cutters with round blades like the Lukas S 700 (E) have the perfect shape of the blades to work their way into the door fold and separate the hinges.

Final Roof Removal

One of the final phases before patient handover to emergency medical services is the complete roof removal. Cut the pillars going from D or C to A in the order of sequence (DD) C C B B A A. But before this can be done seat belts, all possible plastic panels and door sealing rubbers need to be removed. After taking off the roof, all sharp edges are to be covered before extricating the patient in the last step.

Relief Cut

In order to create more space in the footwell we can push away the vehicle front. A 45° relief cut has to be made. After that the door sealing has to be removed and measurement is taken to see how the rescue ram can fit. It is important to realise when pushing, that not only the A pillar, but also the entire front-end of the vehicle is pushed forward and the transverse link between the A pillar and transverse beam does not break.

If a rescue ram cannot be used, an alternative technique to push away the vehicle front is the “spreader method”. Create a “footwell window” by two cuts to insert the spreader. If necessary weaken the car body structure by performing two parallel relief cuts at the front frame rail. Reinforcements at the centre console need to be laid open and weakened if required. Push the vehicle front away with the spreader.

The patient is considered ready to extrication, when the steering wheel edge is removed more than 10 cm from the patient. Now the patient can be placed on a spine board and handed over to emergency medical services personnel.

Patient Extraction

To get the patient out of the vehicle and hand him or her over to the emergency medical services, a spine board can be used. This allows an axis-controlled rescue after taking off the roof.

There is one person beside the footwell observing the patient's feet and ensuring that they will not get stuck during extraction. Two of the tallest crew members are standing at the B pillar manoeuvring the patient onto the spine board. It is important that the patient is hoisted and not pushed. Both men should be of about equal height. Two responders standing back are holding the spine board, but will in no way push it beneath the patient's spine. Way in the back are two more responders who will be taking charge of the patient once he or she is put on the spine board.

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Philip Tasker

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Airport Firefighting – A Day in the Life

For the thousands of airport firefighters covering the UK's 33 main airports life is very different from that experienced by their municipal fire and rescue service colleagues. The differences begin with the type of regime they experience, to the types of emergency they are called upon to deal with on a daily basis.

Airports with scheduled passenger services range from the largest international airports, such as Heathrow and Gatwick to some of the smallest that form part of the Highlands & Islands Airports group of ten locations spread across some of the most inaccessible parts of Scotland. BAA is the largest airport operator in the UK with six locations and employs over 460 firefighters at its sites at Heathrow, Stansted, Southampton, Glasgow, Edinburgh and Aberdeen. The Highlands & Islands Airport group employs 200 firefighters with its main location being Inverness. Manchester Airport is the largest UK owned airport with sister airports at East Midlands, Humberside and Bournemouth. It is the UK's third largest airport able to handle Category 10 aircraft and welcomed the Airbus A380 in the autumn of 2010. It handles around 19 million passengers annually and this is expected to grow to 50 million by 2030.

A Typical Day on Shift

Unlike their municipal counterparts, airport firefighters are required to cover all types of emergencies within the airport boundaries with many of the incidents unrelated to aircraft accidents or

fires. Major aircraft accidents are very rare thanks to strict safety regulations and major improvements in aircraft design and build.

In many locations, the fire services work closely with the ambulance and other emergency services dealing with all types of accidents including traffic incidents, vehicle fires and fire alarms across the sites as well as being placed on standby whenever a pilot alerts air traffic control to any type of malfunction that could present a safety hazard on landing. The most frequent incidents affecting jet aircraft involve overheating of undercarriages, wheels, tyres and brakes as well as engine problems, which although uncommon, nevertheless require putting major emergency standby routines into action.

Station Officer at Bristol International Airport, Rich Lynn, who has 48 firefighters on station, explains that his team are required to cover all emergencies on site including those involving buildings, vehicles and aircraft related incidents. "We provide emergency cover for all the buildings on the airport site as well as dealing with aircraft related emergencies. Although we have very few aircraft fires the main potential areas for fire are



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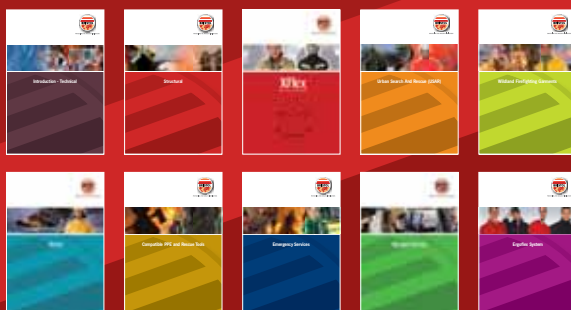
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overheating sub-assemblies, wheels and brakes and any ruptures in hydraulic lines that work at high pressure and could easily cause a fire in contact with hot metal. Carbon fibre braking systems and fans on wheels on modern aircraft have greatly reduced the fire hazard".

Manchester Airport's fire service has responsibility for handling all incidents within the perimeter of the airport which, with 19,000 direct





aircraft simulator, providing LPG and kerosene options, which allows 747/767 under-wing engine training as well as MD11 tail engine experience. In common with other major airports, the majority of incidents are related to undercarriage problems including wheel, tyre and hydraulic damage and malfunctions. The teams also have responsibility for attending aircraft related incidents up to a mile outside the airport but have, on occasion, been called to attend light aircraft accidents up to 15 miles away. The airport training team also provides training for other airport firefighters, some of which are from overseas, including regular visits from a number of Gulf States who are provided with both college and fire-ground training and experience of UK firefighting methods.

Firefighter Clothing

Most, if not all, airports use a selection procedure for purchasing firefighter PPE that routinely

employees, is one of the largest employers in the North West of the country and the size and complexity of a sizeable town. The fire and rescue organisation comprises 104 firefighters in four watches, each of which includes 16 firefighters, six crew managers, three watch managers and a station manager. During 2011 the teams handled 410 incidents of which 117 were aircraft related with a further 286 domestic responses.

Training

Even though the call to action to fight fires may come infrequently, the special characteristics of hot fires caused by burning aviation fuel need special skills. Training is a regular and frequent part of the firefighters working life.

At Inverness airport, part of Highlands & Islands Airports Ltd, there are a number of standbys each year of which three or four will normally require the full emergency response from external agencies, although training is carried out daily. Inverness Airport is responsible for procuring firefighter PPE for all ten airports as well as the managed care services provided. Unlike the other nine airports in the group, Inverness is the busiest and is able to handle aircraft up to A320/321 size. It operates an eight hour, two-shift pattern over seven days covering the times the airport is open, which is from 5.45am to 10.15pm. Hot fire training is done using a simulator rig with fuselage, wing assembly and undercarriage. Fuel for the simulator has recently been converted from aviation fuel to LPG for environmental reasons.

At Manchester the fire crews train every day. This will routinely involve fire-ground training twice a week, interspersed with training for all the other types of incidents that can occur on a complex of this size.

Manchester Airport has a modern dual-fuel

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involves trialling samples of kit from several manufacturers. The alternatives are inspected and supplied to firefighters to carry out wearer trials. Selection is based on a number of criteria including wearer comfort, durability, price, sizing and availability of stock.

A number of airport fire teams are being, or have been, re-equipped over the past few years giving them the opportunity to take advantage of the new lighter weight designs that have been introduced to the market over the past ten years, which provide greater wearer comfort and reduce heat stress associated with prolonged periods of

wear. There is also growing interest in adopting managed services as a means of providing regular inspection, washing and repair as well as maintaining PPE integrity that enhances wearer safety.

Andy Haworth, Watch Manager at Manchester, comments: "Manchester Airport Fire & Rescue has been using Bristol fire kit for the last 20 years, from the old style bunker coat to the new Ergotech design. In that time we had a brief period with another supplier. However, having been back with Bristol since 2005, and two designs later, we have built a very good relationship with them. The Ergotech design has proven to be excellent, combining quality, protection, durability, comfort and flexibility and ideally suited for our industry where we can be called on to deal with aircraft, Hazmat, RTC and domestic incidents." He continues: "We have also been using Bristol's managed services for a number of years. This provides our firefighters with reassurance and the knowledge that their fire kit is maintained and recorded to the high standards required to comply fully with the Health and Safety of PPE regulations".

There has been considerable change in the specification and purchasing of PPE in recent years. The operational demands placed on airport firefighters around the UK may vary considerably from site to site but many airports, including Manchester, East Midlands, Bristol International, London City Airport, ten Highlands & Islands sites and Jersey, Guernsey and Alderney airports in the Channel Islands have one thing in common – they all rely on PPE to protect their firefighters. There has been a steady move to replace traditional PPE designs with lighter weight jackets and trousers as well as an increasing interest in adopting managed services that use unique computer software to track individual garments as part of an integrated maintenance and replacement service. Bristol and Manchester are among a growing number of UK airports now enjoying the benefits of this service.

IFF



Philip Tasker is National Sales Manager at Bristol Uniforms

For further information, go to www.bristoluniforms.com

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DS-3	4	8000	18", 2-Blade	53 lbs.	21.5" X 20" X 17"
DSTS-3P4-5	5	14800	18", 4-Blade	73 lbs.	22" X 21" X 17"
DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

ELECTRIC MODELS

<u>Model</u>	<u>HP</u>	<u>Output (CFM)</u>	<u>Prop Size</u>	<u>Weight</u>	<u>Dimensions</u>
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
EX18SP	2	12000	18", 2-Blade	110 lbs.	21" X 21" X 18"

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Graham Collins

New Firefighting Vehicle Round-up

Despite the economic doom and gloom that is tightening budgets across the world, an impressive number of new firefighting vehicles were ordered or delivered in the past year.

Caribbean's Truckin



Trinidad and Tobago's national oil company has taken delivery of a second ROSENBAUER industrial fire truck specially developed for the industrial and oil refinery sector.

This latest vehicle was fitted out with an even more extensive range of special equipment. It is based on an MB Actros chassis and has three monitors; two on the roof and one at the front. Using the retractable RM60C roof monitor, the overall height of the vehicle can be adjusted to suit a variety of site access conditions. It joined a fleet of Rosenbauer vehicles on the islands, which extends from hazardous material and pumper trucks, to hose carriers and ARFF vehicles.

For more information, go to www.rosenbauer.com

Striker's on Duty at Redmond

OSHKOSH AIRPORT PRODUCTS GROUP delivered a new generation Striker aircraft rescue and firefighting (ARFF) vehicle to Roberts Field, Redmond Municipal Airport (RDM) in Redmond, Oregon, USA. After an initial training period, the vehicle went into service last November. This new generation Striker 6 x 6 ARFF vehicle is the first production model of the prototype unit that was unveiled in the spring of 2010.



The Striker 6 x 6 features an all-wheel drive axle configuration with Oshkosh TAK-4 all-wheel independent suspension and, Oshkosh says, offers a smooth ride and excellent off road capabilities with a side slope stability of at least 30-degrees. The 700HP, Tier 4i/Euro 5 emissions compliant turbocharged engine is mated to a 7-speed electronic automatic transmission for smooth power delivery and a top speed greater than 113 kilometres an hour.

A structural firefighting system includes crosslay discharges at both sides of the truck. The RDM vehicle is outfitted with a high volume, low attack bumper turret. The walk-in engine and power pack area, with doors on each side of the engine compartment, simplifies regular maintenance. In addition, there is a single, easy to access area where all filters and fluid checks are available.

For more information, go to oshkoshairport.com

Columbus Reaches for the Sky

PIERCE MANUFACTURING has received an order for three Pierce Aerial Tiller vehicles from the City of Columbus Division of Fire located in Columbus, Ohio – the department's first Pierce aerial vehicles that will be in service in June this year.

Each Aerial Tiller vehicle will feature a 32-metre heavy duty aerial ladder with a radio-controlled monitor, and a 5th wheel tractor with independent suspension. Other features include seating for six firefighters; an EMS cabinet inside the cab; an LED lighting package; roll-up compartment doors; a full complement of ground ladders and a 20 kilowatt diesel generator.

For more information, go to piercemfg.com



Pumper-up in Germany



To protect its staff, plant and equipment, pharmaceutical and chemical company, the Merck Group, maintains a works fire brigade at its two German sites at Darmstadt and Gernsheim each with a total of approximately 200 full-time firefighters. As an essential part of a modernisation programme it has acquired a total of four purpose-designed IVECO MAGIRUS HTLF 50/30/10 tank pumpers for the two locations.

A fixed, two-stage Magirus FPN 10-5000 normal-pressure centrifugal fire pump with a primatic self-priming device is mounted at the rear and is controlled and monitored by means of an easy-to-operate control unit. This has a colour display in the pump-room and the driver's cabin, and pushbuttons with LED lamps ensure fully-automatic, self-monitoring operation of the pump controls

Capacity of the water tank is 3,000 litres and the foam tank 1,000 litres, while the foam proportioning rates are one percent, three percent or six percent. Delivery is via an electrically-reeled-in quick-attack hose-reel with 40 metres of 32 mm hose. An electrically-adjustable Alco 367 foam/water monitor on the roof can deliver either 4,000 litres-a-minute or 2,000 litres-a-minute. Control of the monitor is from the monitor control stand or by remote-control. Three floor spray jets mounted on the front of the driver's cab protect the vehicle.

A pneumatic light mast with xenon floodlights is mounted on the roof. Extending, multi-purpose ladders are stowed on the roof.

For more information, go to iveco-magirus.net

Panthers in Paris



ROSENBAUER has delivered five new Panther 8x8 ARFF for Paris airports, marking a milestone in the Rosenbauer company history; they are the first order to be won in the very competitive French ARFF vehicle market.

The company says that the Panther 8x8 CA7 is the most powerful ARFF vehicle worldwide. An acceleration of less than 21 seconds from zero to 80 kilometres-an-hour and a top speed of more than 135 kilometres-an-hour at an operational weight of 45 tons represent a world record for regular production vehicles of this kind.

For more information, go to www.rosenbauer.com

Hong Kong's in the Air



CTE delivered a special B-Fire aerial platform to Hong Kong equipped with a water tower arm and an Effer crane for lifting hydraulic tools. This special B-Tower is mounted on MAN truck to produce the multi-purpose vehicle required by the customer.

The CTE B-Fire platform and water tower B-Tower have a range that goes from 22 metres working height up to 62 metres, and are available with a wide range of options to suit the most demanding working conditions.

For more information, go to www.ctelift.com

New Vehicles Take-off at Denver

The addition of two new aircraft rescue and fire fighting vehicles at Denver International Airport in Colorado brought the total number of OSHKOSH vehicles operating at the airport to seven. The two new Oshkosh Striker 4500 vehicles joined four existing Striker 4500s and one Striker 1500 model already on duty at the largest airport in the United States, and the third largest in the world. The airport handles over 50 million passengers a year, making it the tenth busiest passenger-traffic airport in the world.

The Striker 4500 features an 8 by 8 axle configuration and proprietary technologies such as TAK-4 independent suspension, triple-agent firefighting capabilities and Command Zone advanced electronics. It has pre-connected water and foam hoses and carries 17,000 litres of water, 1,590 litres of foam, and 227 kilograms of dry chemical agent. The vehicle's roof turret has 4,542 litres-a-minute flow capacity, while a high-volume, low-attack bumper turret with Hydrochem nozzle has a flow of 4542 litres-a-minute.

The Oshkosh Corporation Airport Products' Striker 1500 is on duty at the Denver Fire Department ARFF Training Academy located within the airport grounds. This cutting-edge facility trains firefighters from around the world in the most advanced methods of fighting aircraft fires. It boasts 16 state-certified instructors, interactive technology and a full-scale aircraft mock-up.

For more information, go to www.oshkoshairport.com



Aerial Platform down Mexico Way



An industrial aerial platform has been delivered to Mexico's state-owned oil company Petroleos Mexicanos (Pemex) – the country's sole producer of crude oil, natural gas, and refined products – headquartered in Mexico City. The PIERCE MANUFACTURING unit provides the greater capabilities and higher flow capacity to respond to potentially large-scale emergencies at oil refineries, chemical and petrochemical plants, and oil depots.

The aerial platform is equipped with a 7600 litres-a-minute single-stage pump, stainless steel plumbing, crosslays for 64mm and 38mm hose, and a 1.3-metre long pump panel. It includes two pairs of stabilisers and the basket features twin monitors for high

flow, as well as heat shields and breathing air to the tip. The aerial also boasts Lyfe brackets for easy deployment of rescue equipment accessories, high intensity lights on the front and underside of the basket, and blue LED lighting running along all three of its sections.

The vehicle body has seven air bottle compartments recessed in its fender panels. Large storage compartments contain an array of full width and full depth adjustable shelving, as well as slide out and tilting trays. The vehicle is also equipped with a 10kW generator to power rescue tools, and a full complement of ground ladders.

For more information, go to www.piercemfg.com

ARFF Fleet is Rio Bound



ROSENBAUER signed a contract with Brazil's state-owned airport operator, Infraero Aeroportos, to supply 80 of its Panther ARFF vehicles worth a total of US 42.9 million.

By undertaking this fleet renewal program, Infraero Aeroportos

is bringing fire-protection standards at Brazil's airports right up to date – all the more important in view of the approaching 2014 Football World Cup and 2016 Summer Olympics. All the country's international airports, such as Antônio Carlos Jobim Airport in Rio

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de Janeiro and Guarulhos Airport in São Paulo, will also benefit from new Rosenbauer equipment as part of this program. This will ensure compliance with the increasingly closely monitored international airport certification regulations of the International Civil Aviation Organisation.

The Rosenbauer Panthers are to be manufactured at the two Rosenbauer plants, with the firefighting systems being supplied from the main plant in Leonding, Austria. The vehicles are to be supplied and commissioned in several tranches by January 2014. The vehicles in question are Panther 6x6s with powerful 665 HP Detroit Diesel engines. They have a top speed of 120 kilometres an hour and an extinguishant payload of 12,870 litres.

For more information, go to www.rosenbauer.com

Chad Refinery's Specials



IVECO MAGIRUS has delivered three refinery fire-fighting vehicles to the N'Djamena Refinery Company in Chad in central Africa. The vehicles were ordered by Petro China, Beijing, and will operate on a new oil field that came into service in 2011.

Two of the vehicles are SLF 60/120 special fire fighting vehicles and feature transverse tanks extending all the way across, with equipment lockers either side of the tanks. The tanks have a capacity of 6,000 litres of water and 6,000 litres of foam. A powerful two-stage normal pressure fire extinguishing centrifugal pump is installed permanently at the rear of the vehicle. There are four water outlets and two quick-attack reels with 30-meter long semi-rigid hose. Additionally, there is an Alco EL 676 water/foam monitor with a maximum extinguishing performance of 6,000 litres at 10 bar. This device is controlled directly at the monitor control stand or via a cable remote control with a length of 30 metres.

On the front axle, the rear axles as well as on the entire driver's cab, the vehicle is equipped with self-protection installation with spray nozzles.

The third vehicle shares many of the other vehicles' features. It is a specialist SLF 60/30-80 firefighting vehicle. In this model the extinguishing agents' capacity is 3,000 litres of water and 5,000 litres of foam; water output is again via four outlets and two quick-attack hoses. An Alco EL 676 water/foam monitor has a maximum extinguishing performance of 4,500 litres at 10 bar. In addition, this vehicle is equipped with a powder extinguishing system with a capacity of 3,000 kilogrammes of dry fire extinguishing powder.

For more information, go to www.iveco-magirus.net

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Thermal Imaging Cameras Buyers' Guide



Graham Collins

In the market for new thermal imaging cameras? In this edition of International Fire Fighter we take a close look at the latest models to come onto the market from the leading manufacturers.

The Eagle Has Landed

The new Eagle Attack thermal imaging camera from SCOTT SAFETY is aimed at delivering all the performance, quality and durability that firefighters demand. After asking hundreds of firefighters for their input in the design and development of this product, Scott Safety says that the Eagle Attack offers a full-featured imager in a compact form with no sacrifice on quality.

Its high resolution design provides users with great image quality, reliability, durability and ease-of-use. It is claimed to be one of the lightest and most portable imagers in the industry. Smaller-sized cameras typically sacrifice features and image quality for portability and, while larger imagers are feature-rich, they can be bulky and more difficult to handle in tight situations. The Eagle Attack combines the best of both small and large imagers.



The Eagle Attack has a generous display, a high degree dynamic range, resolution and sensitivity to make fire analysis quick and easy. The high-functioning lens is protected by silicone bumpers and if anything ever happens to the germanium lens, it has been engineered so that change-out can be done in the field. The camera's charging system is fully loaded with simple-to-use features, like daisy chain charging from one power cable to a low profile casing that can be mounted easily on a vehicle, so it can be out of the way but easily accessed.

The camera can be custom configured to suit the user's changing needs and is offered with either a greyscale or colour imagery and the optional Scott thermal video recorder (TVR) that automatically captures every event for training and documentation purposes. It also comes in three rubber bumper colours to suit the customer's own branding.

For more information, go to www.scottsafety.com

Affordable Vision

Described as "extremely affordable and rugged, enabling every firefighter to be equipped" the HF-Series thermal imaging camera from FLIR produces thermal images of 320 pixels by 240 pixels on which the smallest details can be seen. Advanced internal camera software delivers a crisp image without the need for user adjustments.

A 2X digital zoom allows the firefighter to have an even closer look at the situation when necessary. Further described as ergonomic and easy to use, the HF-Series cameras are fully controlled by just five buttons on top of the unit. Weighing just 660 grams – batteries included – the HF-Series cameras are extremely compact and very light. They are reckoned to be ideal for go-anywhere operations, are IP-67 ingress protection rated and operate between minus 20°C and plus 60°C.

For more information, go to www.flir.com





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Up Close and Personal

According to SOLO THERMAL IMAGING, its S2 Personal camera has been designed as: "a high specification, low cost thermal imager to equip firefighters with intuitive thermal imaging technology. Using the UK designed and manufactured Solo TI camera core means less restriction and greater control, as the company manufactures every single part of each S2 Personal. Designed as an ultra-small camera, small enough to easily clip to firefighters' gear, nomex side hand straps complete the rugged external features."



The camera is claimed to be one of the world's smallest, lightest hand-held cameras, weighing only 750 grams including battery, yet still utilises a large format, high-definition display offering sharper, brighter image definition than a standard display. All S2 Personal cameras have the ability to capture and store up to 1000 images in the on-board memory with the press of a button; a capability that is essential for use as evidential proof or during training exercises. Each camera is also provided free-of-charge with Solo TI analysis software that offers greater detail and allows colour mapping to be extracted from the downloaded images.

The S2 Personal shell utilises a fire-retardant polymer material and includes power pack and locking configuration with further protection offered by the oversized nomex side handles and vulcanised rubber screen shroud. It is offered with Solo TI's high resolution / high definition sensor; the same Solo 5200Ti camera core platform as used in the entire Solo TI camera range. This format offers both greyscale and four colour options as standard.

Although the S2 Personal Fire is a low cost unit it comes as standard in an IP67 hard shell carry case. Four rechargeable batteries with charger and all leads; replaceable display window; direct spot temperature and digital read out with temperature scale running along the right hand of the display; battery gauge; four colour maps; Scene Capture with SOLOTI software all as standard features. User preference start-up screen with on screen menu offered in various languages and a choice of shell colours complete the standard issue specification. Optional extras include a neck strap and retractable lanyard; The S2 Personal can also be specified with either one or two button operation.

For more information, go to www.solo-ti.co.uk

"Second to None" Camera

The handheld Evolution 5000 family of thermal imaging cameras from MSA combines the functionality and durability required by the firefighting service with features and performance the company is heralding as "second to none".



Evolution 5800

At the heart of every 5000 Series camera is a vanadium oxide microbolometer sensor combined with user-friendly features that include single-button activation, dual-handle design for ease of handoff, a lightweight lithium ion battery with two plus hours of run time, a protective battery compartment, and a comprehensive offering of interchangeable accessories. All come with a two-year warranty; extended warranties are also available.

The latest addition to MSA's 5000 Series is the Evolution 5800 that offers imagery with a high-resolution 320 x 240 focal plane array infrared sensor. New image detail enhancement software enhances the camera's imagery in scenes lacking infrared energy. This enhanced imagery, combined with five user-selectable palettes and a standard 2X digital zoom image size enhancer, provides firefighters with a choice of images to maximise scene information in all temperatures. Two Evolution 5000 Series TIC standard features – Standard Quick Temp and Heat Seeker Plus – complete what is said to be the most advanced thermal imaging offering available on the market today.

The Evolution 5200HD² camera is a multipurpose firefighting tool, designed for search-and-rescue,



Evolution 5200HD²

At the heart of every 5000 Series camera is a vanadium oxide microbolometer sensor combined with user-friendly features that include single-button activation, dual-handle design for ease of handoff, a lightweight lithium ion battery with two plus hours of run time, a protective battery compartment, and a comprehensive offering of interchangeable accessories. All come with a two-year warranty; extended warranties are also available.

The latest addition to MSA's 5000 Series is the Evolution 5800 that offers imagery with a high-

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- Large format high definition display.
- Large field of view (51°).
- Speeds searches and increases efficiency.
- Flame-retardant glass filled material.
- Designed to clip to fire-fighter gear.
- Intuitive and user friendly operation.
- 4 x rechargeable batteries and charger as standard.
- Battery life: Operating for 6 hours.
- SOLO mission software offers up to 1000 image capture as standard.
- Multiple colour maps as standard.
- On-screen menus in multiple languages.
- Only 750g inc battery.



S2 PERSONAL SEARCH & RESCUE



Features:

- Ultra small form design.
- Only 750g inc battery.
- Large format high definition display.
- Long range lens giving human detection at 1000 metres.
- Speeds searches and increases efficiency.
- Mil Spec hardened casing.
- Battery life: Operating for 6 hours.
- Intuitive and user friendly operation.
- 4 x rechargeable batteries and charger as standard.
- SOLO mission software offers up to 1000 image capture as standard.
- On-screen menus in multiple languages.
- Multiple colour maps as standard.



Pictures for illustration purposes only. Specifications subject to change without notice.

For information about any of the SOLO Ti range or to set up a demonstration contact -
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THERMAL IMAGING CAMERAS BUYERS' GUIDE



Evolution 5200

field of view, combined with a 160 x 120 focal plane array provides firefighters with the information needed to make fast and, more importantly, safe decisions about their plan of attack.

The Evolution 5600 camera delivers reliable and economical thermal imaging performance in an easy-to-use, time-tested design for firefighters everywhere, providing detailed images from a 120 x 120 focal plane array with over 15,000 pixels and a 45° field of view and featuring Heat Seeker and Quick Temp functions.

For more information, go to www.MSASafety.com

overhaul and size-up as well as structural firefighting. It provides images in low and high-sensitivity modes from the vanadium oxide microbolometer-based sensor incorporating a 320 x 240 focal plane array sensor that generates over 76,000 pixels of image detail. An optional 2x digital zoom for image enlargement further enhances the user's ability to see image detail.

The Evolution 5200, MSA's traditional model thermal imaging camera, has been the classic choice of hundreds of fire departments in the US and across the globe. The large 55°



Evolution 5600

Compact and Ergonomic



The latest thermal imager from BULLARD is the Eclipse, described as "a low-cost, lightweight, personal-issue thermal imager designed for every firefighter". This ultra-small thermal imager is ergonomically shaped to fit in the palm of a firefighter's hand and lightweight enough to attach to turnout gear. Weighing 680 grams, the Eclipse is being promoted as offering the fire service an opportunity to bring thermal imaging to more firefighters.

Introduced in 2009, the Eclipse has gone on to become one of Bullard's most popular thermal imagers. In addition to a standard 80 x 60 engine, it is also available in a 160 x 120 high resolution engine that enhances the versatility of the camera by providing firefighters with clearer, crisper and more detailed images, making it suited for use as an analytical and navigational tool.

The Eclipse can be equipped with optional advanced features, including Bullard's electronic thermal throttle that aids firefighters in revealing hidden fire and distinguishing hotter objects, saving firefighters critical time and preventing costly mistakes. Other optional features include high-heat colorisation, temperature measurement and customised start-up graphics.

For more information, go to www.bullard.com

Redesigned and Enhanced

The SearchCam Recon III camera from CON-SPACE COMMUNICATIONS is a complete re-design of its predecessor, the Recon II that is proclaimed as providing unparalleled reliability, durability and ease of use and exceeding the operational requirements of rescue squads as well as medium/light USAR Teams.



The Recon III is being promoted as fittings today's demanding requirements while fitting in with tighter budget restraints. The new camera utilises a 240 degree articulating camera head with variable high output LED lighting to achieve an effective visual

search as close as a few millimetres to over three metres in total darkness.

The display is attached to the control housing with a quick connect fitting and can be easily removed to extend the camera's reach. Articulation is accomplished by rotating the large, glove-friendly drive collar to the left or right one increment at a time, while the articulation safety clutch automatically re-centres the camera head should it become obstructed.

The camera's pistol grip handle makes positioning and handling intuitive, while providing an easy reference for camera head orientation. The elimination of external wires and belt packs make the Recon III extremely manoeuvrable, lightweight and portable. The Recon III is compatible with the batteries and chargers of the SearchCam 3000, as well as the Delsar LD3 and Delsar Mini Systems.

For more information, go to www.con-space.com

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Eagle Attack by Scott Safety is a tactical lightweight thermal imaging camera. Its high resolution design provides users with great image quality and functionality not normally available in lightweight imagers. Developed for on-the-job reliability, durability and ease of use, the Eagle Attack imager is one of the lightest and most portable imagers in the industry.

TO LEARN MORE VISIT: SCOTTSAFETY.COM



LNG Plant Fire Saf



The historical safety record for the LNG industry is strong. Engineering, installation and lifetime use takes into account the well-known hazards of such an installation. Different levels of protection ensure that potential hazards are discovered and eliminated before they become a major risk to the installation premises and the people working there.

Geir Solem

Autronica Fire and Security

While LNG in its original form is a liquid, it will quickly turn into a vaporized gas upon entering into the atmosphere. Potential ignition sources may create a dangerous situation quickly, and thus the goal is to discover any atmospheric presence of gas as early as possible. This is why the detection system becomes an early as well as important barrier to protect an LNG plant. Detecting potential risks and taking necessary precautions to eliminate or prevent them from worsening is the main objective of the safety system. Several factors need to be examined in order to make sure that we have a trustworthy system.

Typical Detection Solution

There are two key factors when considering a fire and gas detection system: availability and reliability. The first is rather self-explanatory – it is important that the detection system (and its functions) is available when needed. The latter is no less important – that we can rely on the system to perform when needed. The first step to ensure we can trust our system is to look at the chain of devices necessary to detect and take appropriate action.

Every scenario – the beginning of a fire or a gas leak – can be reported by a detector. The detector is the system's initiating device, and its performance is crucial to ensure early and reliable detection. We want to detect the incident as early as possible, and at the same time avoid detection and reporting of unwanted or nuisance alarms. Different detectors have different properties, particularly when it comes to performance. Comparing

datasheets may cause detectors, which perform very differently, to look almost the same. When consulting manufacturers and suppliers of fire and gas equipment, a good rule of thumb is to always ask for what testing has been done according to performance standards, for example FM3260 for flame detection. This will point out the differences when it comes to the performance of a specific device. It is of course important that the equipment has the right ingress protection and can withstand necessary environmental conditions, but after all, it is the performance of the device that determines whether or not it will properly detect an incident.

The detector is part of the detection system, so it is important to avoid loss or delay in the communication channel. A factor in achieving this is to try to utilise a loop, or another form of redundancy, for the communication between the detector and the system. In a loop, short-circuit isolators will ensure that any detector or cable faults will keep all other devices properly communicating with the system.

The purpose of the detection system itself is also to ensure that any appropriate actions are taken. In an integrated fire and gas detection system actions are taken by activating outputs to different devices, for example, activating beacons or sounders and closing ventilation devices or dampers. In such cases, the detection system passes the alarm on to a Distributed Control System (DCS) that will take care of the required actions. However, it is important to highlight the need for a secure communication channel

ety

between the two systems. Very often the project will also require redundancy mentioned earlier for this type of communication.

Safety and IEC 61508

So how do we consider a communication channel or a detection loop to be safe or not? In installations like an LNG plant, a hazard and operability study (HAZOP) is normally done to identify and evaluate potential problems that may be a risk to people or equipment. This will help us determine what kind of equipment is required to protect the installation. However fire and gas equipment have different safety ratings that need to be examined.

Reliability is important for the entire system and not just single components. A good standard for consideration of system availability and reliability is IEC 61508 (Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems). This standard defines what is called "Safety Integrity Level" (SIL), an assessment of reliability, failure to safety (how safe the system is) and management and lifecycle considerations. The SIL tells us something about the probability of a failure on demand; that is, how likely is it that the system functions as intended on the day we actually need it. It can work ten out of ten times when tested, but that does not matter if it fails the next time it is supposed to detect a real hazard.

It is important that the entire system is evaluated according to this standard, and not just single components. The entire system, from detection by one of the initiating devices to action by one of the outputs, should achieve the requested level of safety (normally SIL2 is required for a fire and gas detection system). Combining single components does not necessarily give us the same rating (even if they are rated SIL2 individually). To make sure, we maintain all aspects of IEC 61508, a Safety Analysis Report (SAR) is often done during the project. In order to simplify this and ensure you will maintain the required safety level, you should ask the suppliers to prove compliance of the entire system according to IEC61508. This will ease the projecting of a safety system.

In most cases, an LNG plant is a wide installation with long distances between areas and structures. The installation consists of buildings, process areas, pipelines and other premises to be protected. By choosing a system that can integrate all types of detection as well as extinguishing devices, it will provide a significant reduction in the installation cost. For example, the AutoSafe fire and gas detection system is being applied worldwide in one of the most critical industries, Petrochemical Oil and Gas. Part of the reason for this is that the system maintains a third-party verification and certification according to IEC 61508. The system has just been introduced in Australia, and is about to be installed on the Queensland Curtis LNG project (QC LNG). The QC project involves a 540 kilometre pipeline linking the gas fields to Gladstone, and the construction of a LNG plant on Curtis Island for conversion of the gas to LNG for export. The first stage of the project will include two LNG trains (processing units) with a design lifetime of



more than 20 years. The production capacity should be more than 8.5 million tonnes of LNG per year, increasing up to 12 million tonnes).

The QC LNG project will have one AutoSafe detection panel in each building and, due to the long distances between the buildings, all panels are interfaced via a redundant fibre-optic network.

A similar system is also installed at the Ras Laffan refinery in Qatar. The Ras Laffan Port is a combination of several self-contained buildings and modules, and all detection and extinguishing equipment is integrated into one detection panel. This includes everything from traditional heat and smoke detection, manual call points, and flame and gas detection, to individual release of separate extinguishing zones inside each building. Early warning aspiration systems (HSSD) are also integrated into the same. By combining all the panels into a single plant-wide network, it is possible to monitor the entire plant from one or several locations.

The detection panels interface all types of detectors and take appropriate actions. Communication to a plant-wide DCS is normally done via Modbus or by direct interpretation of the fire and gas systems' communication protocol. In addition, local workstations are located in centralised control rooms and the local fire station. The entire system will fulfil a requirement for a SIL2 rating.

By using loops for all the field devices, we ensure that any break or short-circuit in the wiring will not influence the performance of the system. Even the flame and gas detectors can be protected from such faults by having them localised on a loop. In the solution above, the same two-wire loop also provides power to the detectors, which can translate to major savings when it comes to installation costs.

Fire and gas detection systems for LNG plants can be achieved in different ways; most importantly, we need to consider the safety aspect of the solution. In order to properly accomplish this, we should examine the entire system with all intended functions. Only by doing this, can we say how safe the system is, and if we are able to maintain the required safety rating for the system. After all, the system needs to be 100 percent efficient, 100 percent of the time.

Geir Solem is Application Manager at Autronica Fire and Security AS Div. Oil & Gas

For further information, go to www.autronicafire.no

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Maureen Lander

Action Training Systems

Decade of Disasters Puts Pressure on Firefighter Training

A decade of disasters has increased the demands placed on firefighters. New training systems help departments provide improved training.

The past five decades have seen firefighting evolve from a narrow focus on fire science to embrace extensive training for pre-hospital medical care and other specialised response skills. In the past decade, however, public pressure for even higher levels of trained responders has increased as a result of an unparalleled string of disasters.

On 22nd May 2011, the deadliest tornado in 50 years ripped through Joplin, Missouri USA leaving a swath of destruction ten kilometres long and over one-and-a-half kilometres wide. "There was panic – firefighters were pulling themselves out of the debris and then helping others," said Mike Bettes, a meteorologist from television's Weather Channel who arrived ten minutes after the tornado touched down.

What is shaping up to be the most costly tornado season in US history comes just months after Japan's earthquake and tsunami devastated the country's northern coast, killing over 24,000 and touching off the worst international nuclear emergency since Chernobyl. It had only been eight

months since floods left one-fifth of Pakistan under water. Three years earlier, a cyclone in Myanmar killed at least 146,000 people.

The list goes on. In fact, the top five natural disasters of the past decade caused more than 540,000 killed or missing, according to the website World Weather Post. Time magazine dubbed it "The Decade from Hell." Some would argue it started on September 11, 2001, when more than 400 emergency responders lost their lives trying to save others from the terrorist attacks on New York and the Pentagon.

These catastrophic events, along with the intense media coverage they receive, have changed the public's expectations of firefighters. The pressure has never been greater on departments to train for most any emergency, medical or otherwise, whether it is a minor car accident or a devastating terrorist attack.

Evolution of Training

Until the 1960s, firefighter training was basic and limited mostly to fire science. Then in 1966



Cardiac One was introduced in Ireland. Equipped to treat pre-hospital cardiac patients, it was known as the world's first hospital-based ambulance. That same year, *Accidental Death and Disability: The Neglected Disease of Modern Society*, commonly known as The White Paper, was published. It compared wounded Vietnam soldiers to California highway accident victims. The study suggested that victims' survival rate increased through a combination of community education, stricter safety standards, and better pre-hospital treatment. The pre-hospital treatment often fell to those most commonly first on the scene: firefighters.

The 1970s saw the firefighting community broaden its services to include patient care; and by 1981, 73 percent of American fire departments provided some level of emergency medical service (EMS). This additional service meant that fire fighters were required to train for a whole new skill set.

Throughout the 1980s, procedures and protocols varied by region. Then the 1990s saw careful research that identified the most effective treatments. As the information spread, standards were developed that helped fire departments deliver the best possible EMS.

By the year 2000, professional firefighters had evolved from brigades that put out fires to being true first responders that could administer a high level of on-scene, pre-hospital medical care. But the string of catastrophic events beginning on 9/11 and carrying through to the Joplin tornado and beyond has generated a public mandate that any emergency – from car accidents to terrorist attacks to natural disasters – be met with teams of highly trained emergency responders.

Government Standards

The public's mandate for skilled responders has been met with numerous government programs in most every country. In the US, through the All

Hazards Emergency Operations, issued by FEMA (federal Emergency Management Agency), fire-fighters are expected to train in areas that include but are not limited to:

- Hazardous materials.
- Nuclear disasters.
- Atmospheric contamination.
- Flooding.
- Mass casualty incidents.
- Explosions.
- Structural failures.
- Plane crashes.
- Bombs.
- Pandemic illnesses.

In addition, the post 9/11 Presidential Directive 5 had a stated purpose "to manage domestic incidents by establishing a single, comprehensive national incident management system." It also called for a "core set of concepts, principles, terminology and technology within the incident command system." This directive added yet another level of training requirements for first responders.

Fire departments are working hard to meet the challenge of training its firefighters to a high level of competency in diverse disciplines. Yet as training requirements are on the rise, budgets are being reduced, especially in countries caught in the economic downturn. Departments are looking to advances in training methods and cost-reducing delivery systems to help them close the gap between training and funding reality.

While there is no simple solution, capitalising on new technologies and decades of refined training may help. Training officers worldwide are discovering a tool box of delivery systems that work well together and save money when compared to the more traditional approaches. This latest training leans toward a multi-media, multi-dimensional, and multi-disciplined approach.

New Training Technology

The traditional training classroom is most likely the best environment for new topics or courses on leadership development or how to conduct an evaluation. But classroom instruction tends to be boring and therefore a poor learning experience



for the participants. Multi-media tools, such as interactive video or simulations, can vary the pace, motivate the learners, and enhance learning. Breakout sessions provide hands-on opportunities with simulations. Teams can practice, for instance, with SimMan, the next-generation mannequin that has a varying pulse, bowels sounds, a multi-venous IV arm, and can be intubated.

Simulation tools are a popular alternative to dangerous and expensive real-life training drills. They offer instant, in-station training that is flexible and easily repeated. With simulation, instructors are able to control the situation, which means they can determine which skills are taught, reinforced, and evaluated.

Fire simulation software, like StageIT from Action Training Systems, allows a department to video a local facility and then superimpose fire or smoke onto the interior or exterior. Simulated victims can be added, along with other obstacles, as the instructor asks, "What would you do?" Audio can also be added, such as a roaring fire or running chain saw. This type of training is used to generate a life-like feel and real-scene experience in a simulated classroom environment.

Another effective simulation is available for apparatus drivers. Sitting in a chair surrounded by screens, it is similar to a road racing video game. The participant is able to improve skills or demonstrate competencies such as speed and traffic control. The vehicle can be changed from an engine to a ladder truck to an aide car.

A lot of this technology is new, yet improvements have already been made thanks to training officer feedback. When the first fire simulation software came out, pictures or video could not be added and it did not interface with Windows. Today it is much more user-friendly and continues to improve with each released version.

Simulation is not the only technology-driven training tool. Computer-based training (CBT) is a relatively new application that also offers flexibility and cost savings. CBT was first met with the assumption that it was an inferior training experience when compared to traditional classroom instruction. According to an article in *Professional Safety* by Scott Lawson, a study was conducted to determine whether that assumption was correct.

In the study, two test groups were given an examination, then instruction, then the same examination again. The group instructed using CBT improved their score by an average of 53 percent, while the traditional classroom group improved by only 14 percent on average. The groups were tested again three weeks later. The CBT group again showed better retention over the classroom instruction group.



Improved retention is not the only benefit of CBT. When the fire department of Independence, Missouri, opened a new, \$2 million training facility, Assistant Chief of Training, Steve Bailey, explained the situation: "We can not take everyone out of service at one time to train, so our department broke our crews down into four training groups. To give one class to everyone in the department, we had to teach it four times for each shift, times three shifts, with one make-up class for each shift. So, to teach one class, we had to give it 15 times. We also had to move trucks all over our town of 200-plus square kilometres to get personnel to our training room."

Looking for a more cost-effective training process, Bailey discovered Action Training Systems' CBT programs running on the Illuminar Learning Management System (ILMS) and was impressed with the quality of the video content. "When I did a demonstration of the Action Training Systems' CBT, it was actually interesting," he said. "The video was interesting to watch and if you answered questions incorrectly, it took you back to show what mistake you made. There was no way to hurry and guess your way through it or cheat, which I really liked."



Since 2008, Bailey has purchased about 80 courses, almost the entire ATS library. "With ILMS, we can assign the class to everybody and it is easy to track," he said. "We run reports to tell us who has and who has not had the training, and we can teach to the entire department without pulling a truck out of station and driving across town to the training facility, so now they can stay in service."

Technology for Testing

A close cousin to CBT is computer-adaptive testing (CAT), and Gregg Margolis, associate director of the National Registry of Emergency Medical Technicians (NREMT) is a big fan. He likes the move away from paper and pencil testing because he feels that CAT gives a more accurate measure of skill. As he explains it, with each correct answer the questions become more difficult and, conversely, with each incorrect answer the questions become less difficult. The test is geared so there are about as many right answers as there are wrong answers.

"People should try to get out of their minds the notion to get 70 out of 100 correct," Margolis explains in an interview. "It is not going to happen in adaptive exams. We have all taken many linear exams so it is natural to think in those terms." Margolis goes on to explain that the adaptive nature of the test means that everyone will score about the same; however, a high achiever will get increasingly difficult questions until their maximum competency is revealed. Margolis also likes that the testing environment is secure and that the results are instantaneous.

While technology has become more common and user-friendly in training, today's newest emerging tool is social media. Facebook is used to

make announcements, to communicate within and between departments, and to connect to departments overseas. There is a vast library of videos on www.youtube.com that includes drills, extrications, explosions and close calls; others are simply entertaining. Twitter, StumbleUpon, and other social networking sites are only now being used by the fire fighter training community.

As the demands on emergency responders have expanded, there has never been more pressure on firefighters to perform such diverse skill sets and apply them to a multitude of incident types. The training bar is high and departments worldwide are meeting the challenge through hard work, ingenuity, and a tool box of training systems. At the same time, there are many companies providing innovative products to help improve the training experience.

One such company is Action Training Systems. Action Training Systems is a multi-media development company and worldwide leader in innovative training systems for emergency responders. Established in 1988 in Washington State, USA, and led by President and CEO George Avila, ATS has produced more than 80 courses and 200 products for municipal fire fighters, industrial firefighters and EMS, including training on DVD and CBT (computer-based training) formats, lesson plans, PowerPoint presentations and the StageIT simulation software. ATS teaches only to American national standards such as NFPA for firefighters and NEMSES for EMS personnel and to ensure the authenticity of the content, they shoot in real life locations and only use real emergency responder personnel for demonstrations in their videos. **IFF**



Maureen Lander is responsible for Content Development at Action Training Systems

For further information, go to www.action-training.com

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Fall Protection Pr

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This article summarises and explains the new ANSI/ASSE Z359.7 standard establishing industry guidelines and focuses on minimum requirements for the certification of fall protection products. It examines the key requirements of the new standard, which came into effect in October, 2011.

The Qualification and Verification Testing standard includes requirements for third-party and manufacturer testing, encompassing both testing laboratories, and witness testing of fall protection products. It also specifies the minimum requirements for test equipment and the number of test specimens to be used when testing. Furthermore, the respective product standard specifies performance and design requirements for individual products. All standard requirements must be met before any product can be considered in compliance with any ANSI/ASSE Z359 standard.

Testing

- **Laboratories:**

Qualification and verification testing of fall protection products must be performed in accordance with the standard requirements and the relevant ANSI Z359 standard. The standard defines a product as "a component, subsystem or system, inclusive of all packaging, markings and instructions at the point of sale by a manufacturer." All testing must be conducted through either an accredited third-party testing facility or an in-house manufacturing lab, as long as they are compliant with this standard. These laboratories must be accredited to ISO 17011, General Requirements for Accreditation Bodies Accrediting Conformity Assessment Bodies, to ensure conformity with test and documentation requirements set forth in this standard. They must also be compliant with ISO 17025 General Requirements for the Competence of Testing and Calibration Laboratories. In addition, tested products must meet the complete and most current edition of the ANSI/ASSE Z359 standard and cannot claim compliance to portions or segments of the requirements.

- **Equipment: Drop Test Structure:**

In compliance with ANSI/ASSE Z359 standard, the drop test structure must have sufficient clearance, for example, height and lateral clearance, within the drop zone, beneath the test anchorage or anchorage connector of the structure without interference or obstructions before termination of the tests. Additional drop test structure requirements in the standard include minimum natural frequency of the structure and maximum elastic deformation of the anchorage and connector at the point of attachment.

- **Test Weight and Test Torso:**

Both the test weight and test torso can vary, depending on the specific tests being performed. There may be a requirement for different test weight masses, so it is best to refer to the respective ANSI/ASSE Z359 standard being tested to for



specific weight specifications, including size, mass, centre of gravity, etc.

- **Test Lanyard:**

This section specifies the materials of construction for the test lanyard. The length and connector should be matched accordingly with the standard, depending on which test is being performed.

- **Test Instrumentation:**

Securely attached to the anchorage or anchorage connector, a load cell (transducer) shall register peak loads and must be accurate within 0.5% of its range. This section also specifies a minimum sampling rate and corner frequencies.

- **Quick-Release Mechanism:**

A remotely operated, quick-release mechanism must release the test weight without imparting motion. Upon release of the test weight, the mechanism will trigger recording through the data channel. An alternate method can be used, provided the entire fall arrest time history is captured.

Testing Requirements

New and unused regular production units, from a standard production lot, of a given product model, conforming in all respects to the manufacturers specifications, shall be used for testing purposes. Qualification testing is the initial testing of a product, while verification testing is intended to ensure continuous compliance after said product has been previously qualified. When performing qualification testing, a minimum of three test specimens will be tested. While a minimum of one sample of each compliant product will be evaluated for the purposes of verification testing.

Accreditation Body

The responsibility of the accreditation body is to audit and ensure that testing laboratories meet the

Products

requirements of the standard and ISO 17025, General Requirements for the Competence of Testing and Calibration Laboratories. The accreditation body is not able to have any monetary interest in the profitability of any tested product, nor can they own or be controlled by manufacturers or vendors who have a vested interest.

Fall Protection Product Qualification and/or Verification Testing Options

This standard is intended to ensure that there is continuity in testing performed by all third-party testing and manufacturing laboratories. A laboratory must either be a third-party or a manufacturer's laboratory, accredited to perform compliance testing to the ANSI/ASSE Z359 standard, to be able to perform qualification and verification testing.

● Manufacturers Test Laboratory:

The manufacturers test laboratory may perform testing of fall protection products. But, it is important to be aware that if testing is conducted in a manufacturer's laboratory, the testing must be verified by a professional engineer or witnessed by an accredited third-party lab representative.

● Third-Party Testing:

Each third-party testing representative must:

- Maintain a knowledge of general fall protection products, specifically the product to be tested.
- Have a familiarity with the testing instrumentation and testing structure requirements.
- Possess a comprehensive understanding of the standard, its requirements and related tests.
- Maintain a copy of each standard to be tested, a copy of standard ANSI/ASSE Z359.7 and documentation, verifying their discernment of applicable standards and testing procedures.

Each third-party testing representative will:

- Be present to witness all testing.
- Ensure that all ANSI/ASSE test criteria are met.
- Warrant the accuracy of the manufacturers testing documentation.
- Verify the accreditation of the testing facility to ISO 17025, General Requirements for the competence of Testing and Calibration Laboratories.
- Document, in writing, the adherence to the testing standard and test results in a report conforming to section 38.3. Upon completion of testing, it will be provided to the manufacturer.

● Professional Engineer/Qualified Person:

Any engineer, when witnessing testing, has an ethical obligation to be knowledgeable and experienced in fall protection engineering, equipment and methodology. At a minimum, they should be considered an ANSI/ASSE qualified person, and have related experience. Furthermore, each professional engineer and/or qualified person must operate under the same guidelines as third-party testing representatives, as specified above. At the conclusion of testing, their professional engineer stamp must be affixed to their test report.

Testing Laboratories

Each testing laboratory shall:

- Meet the requirements of this standard.
- Be accredited to ISO 17025, General Requirements for the Competence of Testing and Calibration Laboratories.

- Be knowledgeable of the general fall protection products to be tested.
- Maintain a copy of each standard to be tested.
- Verify that all personnel have read the applicable standard to be tested.
- Possess the ability to conform to specific testing requirements in regards to equipment and/or specialised structures.

● Duties and Responsibilities of Testing Laboratories:

The testing laboratories will ensure that only new and unused specimens are tested and that there is no modification, repair or substitution of any product or product component during testing. In addition, testing laboratories will ensure that all measuring instrumentation is calibrated accordingly. At the conclusion of testing, a report should be generated with the results, specifying whether the product passed or failed, including the following information, at a minimum:

- Title.
- Test Date.
- Product model being tested.
- ISO accreditation of laboratory and accrediting agency.
- Name and address of where testing was performed.
- The type of testing entity.
- Manufacturer name and address.
- Testing method or applicable standards and clauses tested to.
- Sample number.
- Name, functions and signatures of authorised testing personnel, witnesses or professional engineer/qualified person.
- Comments on testing results.
- Testing conditions, such as ambient temperature, etc. that may be significant.
- Testing configuration information, e.g. test weight and free fall distances that may be of importance.
- Any additional required information that is dictated in ISO 17025, General Requirements for the Competence of Testing and Calibration Laboratories.

Duties and Responsibilities of the Manufacturer

If modifications are made that may affect the strength or performance of a product, directly affecting test results, then additional testing will be required in compliance with the applicable standard, in its entirety.

The Manufacturer will:

- Provide complete units to the testing laboratory that are identical in form to that of the end-user product.
- Maintain all design, performance evaluation and testing documentation. This information must be maintained for the duration of the specific product models production life and for subsequent years, after production has ended.

IFF

The Z359.7 standard was developed by an accredited standards committee functioning under the procedures of the American National Standards Institute, with the American Society of Safety Engineers (ASSE) as secretariat. It is recognised that new developments are to be expected and that revisions may be necessary as further experience is gained.

Copies of the new standard are available online at www.asse.org.

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Selecting Hoses and

Sandwich type covered hose with line pressure forcing water along the glue, which can quickly delaminate the whole length. Courtesy: Kidde Australia.



Mike Willson



All fire-fighters work in a dangerous environment, but those tackling the flames are most at risk. The fire hose is a vitally important “lifeline” for firefighters, who rely on them to carry out an effective, efficient and above all a safe job.

The chosen fire hoses must be durable, reliable and flexible to deliver water or firefighting foam agents consistently. Nozzles play a key part in delivering more choices to the firefighter in the “hot seat”, providing the versatility needed to get the job done swiftly and efficiently. Several fire teams found out the hard way, that using hoses beyond their design limits can lead to sudden failure – a false economy that has put firefighters’ lives suddenly, and unexpectedly, at risk.

Three key factors are critical when choosing fire hoses – abrasion, kinking, and liquid pick-up. Keeping these in mind can help avoid this happening to your fire teams, and understand how they should influence your purchasing decisions. Perhaps use it to check whether your existing hoses are really as trustworthy as you think?

Common Hose Requirements

Let us think about how and where we use our fire hoses; what they need to be doing for us; and then review hose design and materials to see what is likely to deliver those requirements. Whether you are an industrial, municipal, aviation, marine or military firefighter, your fire hoses are likely to:

- Be regularly dragged across and through abrasive materials.
- Come into contact with a range of liquids from water and fuels to more aggressive chemical spillages that can quickly affect or attack unprotected jacket fibres, even in some covered type hoses.
- Be often used in confined spaces and complex layouts including high rise buildings.

The ideal firefighter’s hose needs to provide a reliable, consistent water flow even at lower pressures, whenever and wherever the firefighter

needs it, reliably time after time. To do this it needs to be particularly durable, flexible and long lasting.

How well do Hoses Stand up to Abrasion?

Dragging hoses weighed down with water through grit, over tarmac, rubble, broken glass and other debris is common place, but the design of your hose will have a significant bearing on how long it will stand up to this rough treatment.

The jacket fibres are vital to containing the water pressure and delivering it effectively to the firefighter’s nozzle. Damage here will cause the quickest premature failure. In the USA, alternative “double jacket” hoses are often used to try and overcome this problem. The hose jacket fibres are protected by an extra jacket, designed to be worn away and protect the inner jacket from damage. It can work well, but makes the hose much heavier and harder to use, particularly when both jackets are wet. It also provides little protection from liquid contaminants that can attack or weaken key internal fibres. They also need extra time spent washing and drying after each use, requiring increased stock levels to ensure sufficient hoses are ready for action.

In many countries “canvas” or “double jacket” types have largely been replaced by wipe-dry rubber “covered” type fire hoses. The main exception is bush firefighting, where controlled percolation hoses are still widely used, to intentionally leak a film of water to protect the hose from burning.

The variety of “covered” fire hoses comprise essentially two basic types, each having jacket fibres with internal rubber lining and external rubber cover, to reduce abrasion damage and

d Nozzles

chemical attack. The answer lies in selecting those that deliver on your stringent requirements. It is all about construction methods and materials used, delivering firefighters the reliability, long term durability, and value for money they need and deserve.

Often heavier and cheaper, are the “sandwich” type construction covered hoses. These are literally glued together in a sandwich of lining, textile jacket and outer cover. In theory this is a good solution, but the rubber mix usually has high levels of PVC that are not as flexible or resistant to abrasion, heat and sunlight as nitrile. Any slight damage to the cover will allow water and contaminant absorption by the jacket fibres, acting like blotting paper. When the hose is next pressurised, this liquid tries to get out, but both impervious outer cover and inner lining force it along the line of least resistance – the glue. These forces can often strip the cover or lining from the jacket in seconds along its whole length, often causing premature failures. The hose becomes suddenly useless, the system must be de-pressurised, the length replaced before continuing, but firefighter safety can be severely compromised.

This sudden and often unpredictable failure, can be avoided by choosing the more resilient “through the weave” type covered hose. As the term suggests, during manufacture the inner lining and outer cover are produced under pressure and squeezed through the jacket weave in a single operation, making it very strong with solid pillars of rubber linking cover to lining through the jacket, without glues. Tiny pinholes made in the cover release volatile gases from the lining during its steam vulcanisation process, to prevent internal blistering and potential lining damage.

Leading brands such as Angus Duraline have developed special nylon textile jacket fibres that flex more easily, accompanied by unique optimised PVC/nitrile rubber formulations. Additional chemical bonding takes place between jacket and rubber during this curing process. Solid plugs of natural latex rubber fill these tiny pin-holes under vacuum to completely seal the hose and provide the levels of flexibility and durability required to protect the firefighter, deliver exceptional firefighting performance and good value for money. Each length is pressure tested to 22.5 bar g. before leaving the factory to ensure its durability, and long life. I have seen these Duraline fire hoses after many years of constant use by municipal fire brigades and industrial fire departments, outperforming other newer covered hoses already giving problems at less than half their age and usage.

How is Kinking Important?

Many firefighters seem to overlook the critical importance of kinking, or lack of it, in their fire hoses. Kinking or folding of fire hoses during use is commonplace, but causes two important things to happen. It can put lives at risk when the kink restricts or ceases water flow to the nozzle operator tackling the fire. The kink also causes a high point on the hose that leads to excessive abrasion

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HOSES AND NOZZLES

The Cleveland coil method gets hose up heights easier, and charges the hose fully and quickly in the coil, even in restricted areas presenting full flow for firefighting. Courtesy Angus Fire



at that point when dragged, causing early hose failure.

This can easily happen if hoses become twisted, are moving through confined spaces like doorways, upstairs, in high rise buildings or operating at lower pressures. Kinking also results from dragging unpressurised but partly full hoses, or sudden drops in pump pressure, allowing the hose to relax and cause a kink. This dramatically reduces water flow and increases the risk of bursting. If kinked against an obstacle, the only answer is to find the offending obstruction, wasting valuable time and potentially putting colleagues at risk. Most hoses will kink quite easily at pressures around 5 bar g, but how do you know whether your hoses will kink easily or not?

A Simple Kink Test

You can conduct a simple test, similar to that used by the UK Navy before accepting any fire hose for use on board ships:

- 1 Lay the hose out in a straight line.
- 2 Fill a 45 gallon drum with water, and place next to the hose.
- 3 Bring the hose tight round the drum, in a smooth curve.
- 4 Connect the hose to a nozzle in the 'off' position, and pressurise the hose to 5 bar.

Are there any kinks? If so, your hose is prone to kinking and could not only cause unnecessary operational problems, but also cause sudden and premature bursting from abrasion at the kink point, placing firefighters at risk.

Many hoses that fail this simple test have cheaper polyester jacket fibres, which do not extend in the same way as nylon's ability to minimise kinking. The best "through the weave" performers are those with special nylon textile yarns that maintain their profile and resist kinking at pressures as low as 3 bar, again such as, Angus

Duraline. Such low kinking hoses are best suited for the Cleveland coil stowing method, increasingly used for high rise buildings. This lessens the burden on firefighters working in restricted environments, yet ensures speed of deployment with maximum water flow at the nozzle, delivering both optimum firefighter protection and fire impact.

Increasing numbers of firefighters are recognising that kinking exposes them to unnecessary risks, and causes premature damage reducing hose life. Many are now specifying a kink test, in addition to BS 6391 Kitemark specifications for their hose (the world's best performance fire hose specification) to prolong hose life, increase value for money and increase firefighter safety.

What Else Causes Fire Hoses to Commonly Fail?

The next most important factor is the amount of liquid absorbed into the jacket. Operationally this could be firewater run-off, hydrocarbon fuels, or a variety of industrial chemicals, like polar solvents, acids or alkalis, all of which can attack or weaken the crucial jacket fibres that are retaining and delivering consistent pressurised water flow to the firefighter. "Through the weave" hoses with optimum PVC/nitrile rubber and plugged pinholes are the best answer to reducing liquid ingress to the jacket fibres, and prolonging the safety and life of your fire hose.

There are many other reasons and causes for failure including lining damage causing water to enter the hose, commonly delaminating "sandwich" type hoses; damage from radiant heat and burning embers that can melt and burst the hose, unless adequate levels of nitrile are included in the formulation; attack from sunlight causing deep cracks in the cover where high PVC levels are used.

Which Diameter is Best?

Having selected a "through the weave" fire hose with nylon jacket fibres and high nitrile to PVC content cover and lining to meet your stringent needs, we need to consider the suitable hose diameter and its impact on pressure as we move further away from the water pumping source.

For long distances, 64mm is common for industrial locations, and even larger diameter 125mm or 150mm layflat "through the weave" hoses are being used by many industrial and larger municipal fire departments to help speed up hose deployment and deliver more efficient configurations, particularly where large water or foam flows are needed. Smaller diameters are preferred where only one or two lengths are used from the pumped supply to maximise flexibility, but they will increase the frictional pressure losses. Using a smaller diameter at the end of the hose lay is a good way to gain flexibility while minimising pressure losses.

Increasingly municipal fire departments are looking at smaller diameters of 52mm, 45mm or 38mm at the nozzle to increase manoeuvrability, reduce weight and save water. Smaller diameters make better use of limited water resources and lower pressure availability, particularly in regional and remote areas, where vehicles may be reliant on their water tank for some time, until back-up supplies can be relayed and connected.

Which is the Most Appropriate Nozzle to Choose?

Despite a bewildering array of styles, there are several key factors to consider. Firstly the likely flow rates that can be supplied by the fire pump(s), hose diameters and layout configurations, which need to be calculated and will determine the usable flow range of the nozzle selected and the inlet connection to attach to your fire hoses.

The materials of construction, whether aluminium alloy for drinking water quality, or the more durable corrosion resistant but heavier brass construction, where borehole or salt water is frequently being used, consider a shut-off option, so you can save water while changing your position of attack, or during mopping up. A jet-spray facility helps cover larger areas more quickly and provides some operator protection, while spinning or fixed teeth can vary the spray pattern. Selectable flow variation helps minimise water damage, reduce usage during damping-down duties and increases flexibility for smaller fires.

Past preferences will also inform your decision, but a pistol grip is very popular as it helps control and better direct the water stream from the nozzle. Colour coding of shut-off handles and pistol grips could be useful for larger users with a wide range of nozzles to identify specific roles. A stainless filter mesh at the inlet is also advisable to prevent sudden blockage or damage caused by debris in the water. You may decide that a constant flow rate is necessary irrespective of whether the nozzle is set on straight stream, spray

or full fog. Alternatively, if you have fluctuating water flows an automatic nozzle will maintain an effective pressure and consistent stream for the firefighter. A new dual pressure capability allows switching between 5 bar and 7 bar at the nozzle to better control your application.

A Multi-Purpose nozzle may be ideal, providing a solid bore, fog spray or combination of both to meet your requirements. Alternatively a shock-less nozzle that goes to fog first before jet, to reduce the sudden reaction forces could be appropriate, particularly for training rookie firefighters. Many of these nozzle styles are NFPA 1964 compliant or FM approved. Some exceed both criteria like Protek's popular 366.

More Specialised Applications

You may decide a more specialised nozzle is required for your application, perhaps for wild-land, forest firefighting, high pressure use, play-pipes for multi firefighter applications needing high flow rates, flammable liquid control with a foam nozzle, or marine use. You may be looking for an adaptor to make better use of your existing nozzle with a clip-on foam tube, piercing adaptor for inaccessible areas, or dual agent AFFF foam and dry powder nozzle, used separately or together, for controlling pressurised liquid fires.

Selection of the appropriate nozzle and fire hose design will provide your best answer to deliver reliable, fast, efficient and effective fire control, firefighter safety, durability and long life, plus excellent value for money. Keep safe. **IFF**

Mike Willson is a Consultant in areas of specialised Fire Protection

For further information, go to www.angusfire.co.uk

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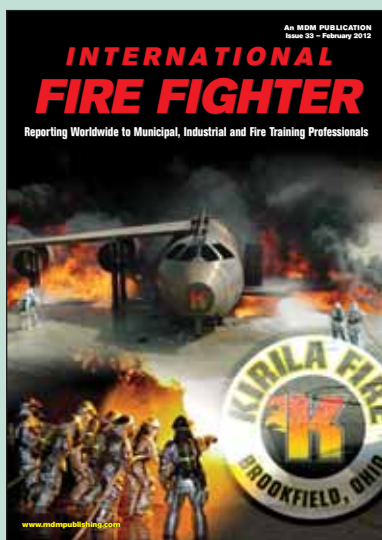


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ADVERTISERS' INDEX

Alert Disaster Control	4
Angus Fire	71
Argus Thermal Imaging	52
Bristol Uniforms	42
Bronto Skylift OY	46
Con-Space Communications	21
CTE Lift	14
Cutters Edge	60
Dafo Fomtec	IBC
Devon & Somerset Fire & Rescue Service Training Academy	18
Dr Sthamer Hamburg	43
Dynax Corp	24
Emergency Services Training Institute (Texas A&M)	50
FDIC 2012	2
Freidrich Seiz	54
Goliath Footwear	27
Haagen Fire Training Products	35
Holmatro	40
Hytrans Systems	27
Isotemp	11
Kirila Fire Training Facilities Inc	17
Kussmaul Electronics	13
KV Fire Chemicals	29
Lukas Hydraulik	39
On Scene Solutions	10
Paratech	69
Plastika Akrapovic	30
Plastisol	51
Rollnrack LLC	65
Rosenbauer	OBC
Russwurm Ventilatoren	32
Scott Safety	57
Shanghai Zanray Industrial	12
Skedco Inc	9
Solo Thermal Imaging Ltd	55
Super Vacuum Manufacturing	35
Task Force Tips	IFC & 1
Tempest Technology	33
Unifire Power Blowers	45
Yone Corporation	23



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INTERNATIONAL FIRE FIGHTER

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G-Force Nozzles: The Inside Story

Based on a highly customizable global nozzle platform design, the unique G-Force series of fixed, selectable, and automatic nozzles combine over 40 years of Task Force Tips design innovation and experience into true next generation firefighting tools. Manufactured exclusively at TFT's USA production facilities, the G-Force series is supported by an extensive infrastructure of 24-hour technical service representatives, on-line documentation, digital video training library, exclusive product serialization and tracking capabilities, and a proven 5 year product warranty. Incorporating unique performance components such as a stainless steel slide valve, inlet debris screen and protective fog pattern choices, the G-Force series delivers high performance and rugged dependability.

Serialization provides track-ability and immediate access to on-line operational instructions

Integral Inlet Screen prevents debris from entering nozzle and affecting stream quality

Stainless Steel Slide Valve provides turbulence-free flow control when gated

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operational markings and
highly visible reflective labeling

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pressure or flush selections
with a gloved hand



G-Force



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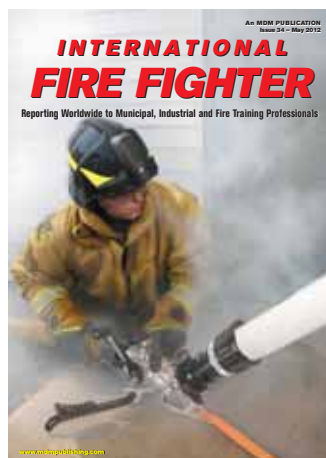


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Contents



15-17

**6-13 News &
Profiles**

**15-17 Specialist
Rescue Training:
Rope, Flood & River**

**19-21 Aerial
Laddering & Access
to Aircraft**



19-21

**23-25 Foam
Delivery - Getting
the Proportions
Right**

**26-28 The
Benefits of Mobile
Fire Protection
Applications**

**31-39 Jumping
Out of Perfectly
Good Buildings...
Works for Me!**



23-25

**40-42 Using
Simulators to
Enhance Hazmat
Training & Exercises**

**45-48 USAR:
Be Prepared**

**50-51 HazMat
Team Tackles Road
& Rail Spillage
Incidents**



26-28

**53-56 Liquefied
Gas Firefighting**

**59-63 The "m" in
mSv Stands for Micro
- Right?**

**64 Advertisers'
Index**



31-39



40-42



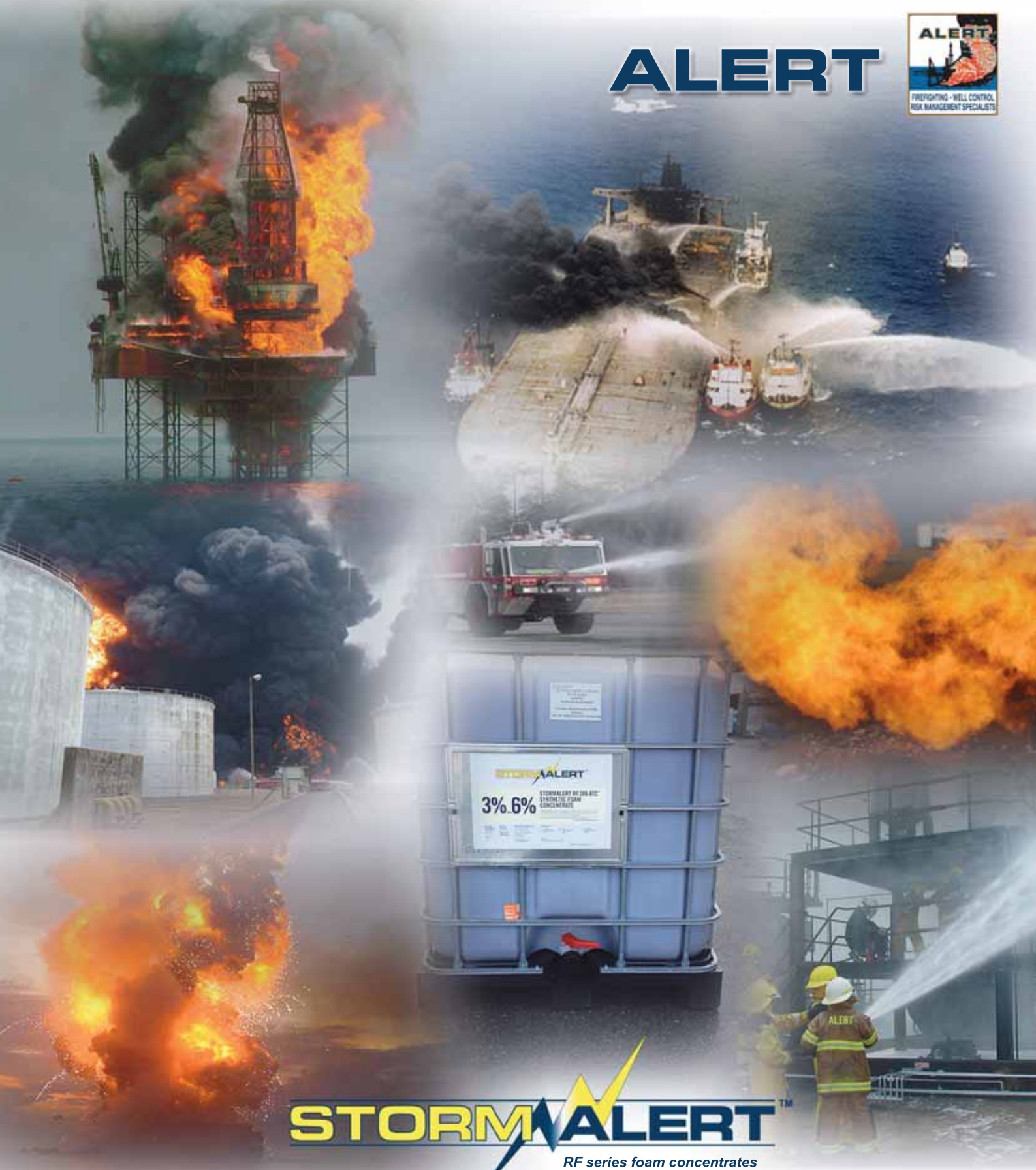
50-51



59-63

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The Shape of Things to Come

Changes in demographics around the world are going to have a major impact on the threats firefighters face, the conditions in which they operate, and the tasks we ask fire and rescue services to perform.

Putting to one side for the moment wildland and forest fires there is, arguably, a strong correlation between where populations are at their greatest density and the incidence of fire. It is perhaps an over simplification, but fires generally occur where people live, work and play, with the frequency or impact increasing when this is accompanied by poverty, overcrowding and inadequate or non-existent fire safety precautions.

In 2011, global population passed the 7 billion mark and, if The Economist magazine's pronouncement just three years ago is correct, as a result of rapid growth in emerging countries over half now belong to what can loosely be described as the middle class. Current assessments suggest

2008, for the first time in history, more than half of the world's population was living in towns and cities. By 2030 this number is expected to swell to almost five billion; in other words, the majority of the middle class population will be compressed into ever more crowded urban areas. Many, including the United Nations Population Fund (formerly the United Nations Fund for Population Activities or UNFPA) support this move for the economic, employment and general prosperity opportunities it presents.

It is not too speculative to suggest that in many parts of the world, particularly in the developing nations, these urban areas may increasingly be characterised by affluent city centres that are surrounded by slums or shanty towns. Certainly

Informed predictions suggest that something like two billion people will soon be living in or near abject poverty in urban slums worldwide, invariably in housing and working conditions that fall far short of the developed world's standards of fire safety. The implications are significant for those responsible for fire and rescue operations.

that between a further one and two billion people globally aspire to join them. If correct, this means that the world's middle class is set to represent over 70 percent of the world's population.

This movement toward seeming affluence may be heart-warming in many respects. However it masks a looming potential problem for those responsible for our fire safety. For a start it leaves something like two billion people living in or near abject poverty (currently around 828 million people live in urban slums worldwide) invariably in housing and working conditions that fall far short of the developed world's standards of fire safety. Indeed, there are predictions that, as the world become generally more affluent, the prognosis for those left behind in the economic race is that their plight will get progressively worse.

At the other end of the spectrum, as more and more seek "the good life" the urban areas will become ever more crowded and congested. In

the way in which many of these urban centres have developed in recent decade would seem to support this contention, particularly in parts of South America, Africa and the Asia Pacific region.

Humanitarian considerations aside for the moment, the question the fire and rescue fraternity – and particularly those responsible for resource planning, training and equipment acquisition – have to address, is: how to be ready to meet the challenge? Coming up with the answers may well take them into relatively uncharted territory and, in some countries, the top echelons of fire and rescue authorities are going to have to ensure that their voice is heard sooner, more clearly, and more forcefully. Equally important, that their views are respected and acted upon more frequently. If not, the shape of things to come when it comes to fire-fighting, urban search and rescue or the aftermath of a natural disaster may well be a spectacle of horrific proportions.

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Pumpers and Tenders

Two PIERCE MANUFACTURING Arrow XT pumpers have gone into front-line duty with the Rapid City Fire Department in Rapid City, South Dakota, USA, increasing the department's Pierce fleet that now includes six front-line engines, one reserve engine, one aerial, and five wildland brush trucks.

The Arrow XT pumpers are each equipped with a Detroit Diesel 470hp engine, 3.9-metre long aluminium body, 255mm raised roof cab, seating for four firefighters, and three EMS cabinets inside the cab. The vehicles also feature frontal impact and side roll protection systems, TAK-4 independent front suspension, Command Zone electronics, a 5,700 litres-a-minute pump, 2850-litre water tank,



Husky 12 foam system, 95-litre foam cell, and lowered cross-lays.

Pierce has also delivered a wildland tactical water tender (TWT) to the Garden Valley Fire Protection District in California's El Dorado County. Engineered to meet National Wildfire Coordination Group approved specifications, the new apparatus will provide water support for wildland firefighting operations for the District, as well as powerful fire suppression capabilities when called upon.

The new TWT is built on a Freightliner

chassis with a 360hp engine and seating for two firefighters. The apparatus features an 8000-litre water tank, a 180-degree quick dump rear discharge, and a 9500-litre portable folding water tank. The vehicle is also outfitted with a remote control front bumper turret, rear inlet, 335 metres of supply line, SCBA bottle storage above the wheel wells, and a hose reel.

For more information, go to www.piercemfg.com

New PPE for UK Brigades

South Yorkshire Fire and Rescue Service has become the first fire service in the UK to re-equip its firefighters with new PPE incorporating a PBI black outer-shell. BRISTOL UNIFORM's Ergotech Action structural kit is being supplied as part of a fully managed service contract and has recently been deployed for its 900 firefighters located at 23 fire stations across the county.

Bristol reports that this is one of a number of recent PPE contracts that have specified new coat and trouser combinations, as fire and rescue services take advantage of the latest technical fabrics and wider colour options. The UK's West Midlands Fire Service has taken delivery of its new navy and red PPE using a Nomex Titan outer-layer; part of an eight-year head-to-toe supply contract requiring 1800 sets. Devon & Somerset fire and rescue service has ordered a further 1000 sets of PPE incorporating a Nomex Titan outer-shell.

Industrial companies also feature among the firefighting organisations to recently purchase Ergotech Action fire coats and trousers. These include Derby-based Rolls Royce Submarine Nuclear Power Plant for its firefighters and special Nomex coveralls for the company's Health Physics team.



For more information, go to www.bristoluniforms.com

New Dive/Rescue Apparatus

Louisville Fire Department/Jefferson County Metro Government in Kentucky, USA has ordered a dive/rescue unit from SEAGRAVE FIRE APPARATUS.

The Department utilises a "task force" concept with an existing aerial ladder and pumper to respond with the rescue truck to water-related emergencies. The new unit will operate out of Louisville Fire Department's headquarters and will replace a 1990 light-duty vehicle that served as dive rescue response vehicle. It will enable additional rescue equipment to be carried and will better withstand the demands of emergency response.

The single-axle apparatus incorporates a 20kw hydraulic generator and a command light tower for on-scene lighting. The 3.9-metre stainless steel split-tilt cab has seating for six, features a 400mm raised roof and a cab-to-body walk-through. The rectangular-tube steel roll cage sub-structure of the cab provides a safe environment for firefighters to and from the scene. The walk-in/walk-around configuration allows the responders to put their gear on inside. Other features include ceiling lighting, a bench seat, coat rack bar, interior heat and air conditioning, body side windows, a transverse compartment and a large rollout tray in the back of the unit where the dive packs will be mounted.

For more information, go to www.seagrave.com

New Battery Combi Tools SPS 270 and 360 E-FORCE

One highlight of the year from Weber Rescue Systems is the new battery-operated combi tools in the E-Force series.

Lightweight, strong and flexible because of the changeable battery, these modern combi tools provide maximum force without being connected to a power unit.

The modern and powerful 28 V Li-Ion battery-technology ensures a longer-lasting operating time and enables flexible operation in regions that are difficult to reach.



The click-on/click-off-system provides a fast and easy battery change, saving valuable downtime. The lightweight and compact construction of the tools additionally saves space and weight in the fire truck.

Various accessories like the ram attachment, chain set, pulling device, battery charger, battery pouch and belt are also available. Furthermore, the batteries are compatible with other battery-operated tools offered by WEBER RESCUE Systems such as the recip and metal-cutting circular saws.

For more information go to www.weber-rescue.com.



On-Site Spill Protection



BundiQuick is the latest innovation from spill control specialist, LUBETECH that can be folded and stored in a cab or trailer. It is being promoted as being a fast, flexible, quick-deployment solution to incidental spill management, snapping from a 'bundle' to a bund in seconds for all wet goods, foodstuffs, fuels, oils and non-aggressive chemicals.

Depending on the model, the self-extending bladder system retains up to 500 litres. Following safe capture of the liquid, it can be detached using a special bulkhead fitting allowing the contents to be decanted back into a tank or secondary containment using the optional pump.

For more information, go to www.lubetech.co.uk

Ready for Action Combi-tool



LUKAS is promoting its lightweight SC250E combi-tool as the ideal hydraulic tool for applications where casualties are hard to reach, such as in narrow tunnels or natural disasters, or where every gram of weight counts when transporting rescue equipment. The SC250E is ready for action at the press of a button, and rescues can be carried out with complete freedom of movement, without the need for power units and hoses. It enables cutting and spreading to be achieved without changing tools, spreading even the narrowest openings with the flat tip to free injured people.

Boasting short opening and closing times, the SC250E is being promoted as being particularly suited for use on advance-construction vehicles, motorcycles and helicopters. Like the larger SC350E, the smaller, lighter SC250E is equipped with the proven star grip control for simple and intuitive operation. It offers a cutting force of up to 280 kN and a spreading force of up to 405 kN; a spreading distance of 318 mm, a pulling force up to 32 kN, and a pulling distance of 330 mm.

For more information, go to www.lukas.com

Iveco Magirus Dragon New Standards for



The Iveco Magirus Dragon 2 range represents a completely new generation of customised ARFF vehicles, with performances that exceeds current ICAO and NFPA requirements. In keeping with the Iveco Magirus philosophy, this latest solution has been developed in-house and is produced using a single-source responsibility, one-stop-shop approach.

The new range's modular structure make it possible to achieve different configurations and drive variants that include a 6x6 on a three-axle chassis, and an 8x8 on a four-axle chassis with a Twin Engine Power Pack (TEP) drive system, as well as a 6x6 model with single-motorisation based on powerful Iveco engines and – as a special option – a Deutz engine.

The 8x8 Dragon chassis with a Twin Engine Power Pack drives the vehicle and the fire pump and delivers better performance than a single engine solution. The two electronically controlled Iveco Cursor 13 engines provide a total power of 1,080 hp in Euro 3 or 1,120 hp in a Euro 5 version.

All of the innovative concepts were specifically developed for this innovative new range: drive train, extinguishing systems, controls and body-work design are all perfectly matched to the chassis. The modular design makes it possible to create different vehicle configurations to match precisely the customer's needs.

The first customer for the Dragon was Hong Kong International Airport. Up to now five new Dragons have been supplied to major airports around the world, and another 25 units will be delivered this year.

Several other factors account for the immediate success of the new range. A new driver cab provides space for three, four or six crew members, with up to four equipped with breathing apparatus. The driver seat can be positioned on

the left, right or centre, and the cab is a well-designed workplace providing maximum comfort and functionality. Vehicle entry is ergonomically optimised for firefighting operations, while large, lowered windows provide optimal visibility in all directions. The crew cab features hinged doors or automatic sliding doors. Large air grilles guarantee maximum cooling efficiency, while the rear cover panel allows access for maintenance and repairs.

Chassis

The newly-developed, rough terrain capability vehicle has a rear engine and rigid axle suspension with coil springs, single tyres with same track width for faster forward progress and larger track for maximum stability. It also features hub reduction axles with disc brakes for maximum ground clearance as well lower starting torque.

Electrical installations are all in 24V according to the European Standard. As standard, the control of the electronic apparatus is via an advanced CANBUS system.

Engines/Power Pack

The Dragon ARFF is powered by Iveco Cursor engines that provide a fast-response acceleration time from 0 to 80 km/h in less than 25 seconds for the Dragon 8x8 chassis, and less than 23 seconds for Dragon 6x6, and a top speed of up to 135 km/h.

The new-generation Cursor engines are more responsive and interact to a higher degree with

Dragon 2 Series Sets ARFF Vehicles

Items	Dragon 6x6	Dragon 8x8
Wheel base	5050 mm	4050/5050 mm
Engine power	397 kW/540 hp up to 824 kW/1120 hp	794 kW/1080 hp up to 824 kW/1120 hp
Maximum speed	> 135 km/h	> 135 km/h
Tank volume, water	10,000–12,500 litres	12,500–17,000 litres
Tank volume, foam	1,200–1,500 litres	1,500–2,000 litres
Dry powder	250 kg	250/500 kg
CO ₂	120 kg	120 kg
Pump output NP	10,000 l/min	10,000 l/min
Pump output HP	250 l/min at 40 bar	250 l/min at 40 bar

the automatic gear-box. A variable geometry turbocharger assists in delivering high torque across a wide range of engine speeds.

The twin-engines concept provides more power and pump-and-roll operations where you can do up to 70 km/h, whereas on a vehicle with one engine the maximum speed is 20 km/h. The pump-and-roll operation with maximum water flow rate is available above an engine speed of 900 rpm. The maximum speed of the Dragon 6x6 and 8x8 is 135 km/h (depending on model and GVW).

Brake System

The brake system of the Dragon is fitted with the latest EBS (Electronic Brake System) and disk brakes with ABS. This delivers an extremely fast response time and short braking distance, low wear on brake parts, perfect stability and comfort when braking.

The Dragon also features an engine brake as a standard, ensuring greater brake performances. It acts automatically when the engine throttle is released.

Gearbox

The gearbox is a fully automatic Allison power shifting transmission with hydraulic retarder. Engine-driven PTO facilities provide optimum auxiliary power and efficiency while operating on the move or when stationary.

The transfer box is mounted separately from the gearbox, making for easier maintenance and repair.

Drive Line

The Kessler-Magirus drive line system with the "summation box" enables operations in driving mode and pump-and-roll mode. In the driving mode the power of both engines is transmitted to the axles; in the pump-and-roll mode the system will couple the left engine to the fire pump, while the right engine will drive the vehicle independently, allowing a full pump and roll operation.

Due to the power divider, pump operation is possible during driving forward or in reverse at any speed, with a maximum pump power consumption 272 hp

Modular Range & Extinguishing Technology

Water tank capacities are from 5,500 litres to 19,000 litres, and foam tanks with different capacity options and several types of proportioning systems are available, as are a 500 kg dry powder and 120 kg CO₂ option.

Different types of Iveco Magirus firefighting pumps with normal pressure, or combined pumps with normal pressure and high pressure are also on offer with pump outputs spanning from 5,400 l/min up to 10,000 l/min. In addition to a powerful-throw roof monitor, there is a front-mounted monitor and quick-attack hose-reels inside the bodywork for water, foam or powder. Alternatively, a telescopic piercing nozzle can be mounted instead of the monitor, as well an extendable turret HRET.

All in One

No other manufacturer of firefighting vehicles can offer chassis, superstructure and components – everything from just one source! From the chassis to the bodywork, everything is in-house developed and so is optimally matched each other. Iveco Magirus is a partner that takes end-to-end responsibility of the entire vehicle, for as long as the vehicle is operating for the customer.

The company-owned testing facilities, allowing thorough testing of all performance parameters of the final product, including engine power, torque, brake force, brake balance and ABS operation, as well as on- and off-road-behaviour such as climbing ability, side slope testing. Iveco Magirus can therefore be relied upon to develop vehicles that guarantee the highest levels of robustness and reliability for all conditions of use.

At six locations in Europe, the Iveco Magirus group develops and manufactures a worldwide unique range of vehicles and appliances for firefighting and civil protection. Iveco Magirus is considered internationally to be one of the largest manufacturers and a world leader in technology in the sector.



For further information, go to
www.iveco-magirus.com

Intelligent Fire Suits



Marine and fire safety equipment company, VIKING LIFE-SAVING EQUIPMENT has added technology to its range of fire suits that enables them to detect if a firefighter is in increased danger as things heat up. Every VIKING suit can now be ordered with the option of adding the company's thermal sensor technology (TST), which provides firefighters and those around them with clear warning signals as temperatures increase.

The company says that research shows that heart attack due to heat stress is the leading cause of death among firefighters in action, and that Viking fire suits equipped with TST technology are designed to reduce some of the factors that cause heat stress. Temperature sensors attached to two displays on the arm and shoulder indicate to firefighters and their teams critical temperatures, both inside and outside the coat.

Paradoxically, the company says that its technology is partially an answer to a problem that arises because today's fire suits have become so good at protecting their wearer. The heat insulating textiles in modern fire suits, together with other equipment, protect the skin so well against radiant heat that it is becoming a

challenge for firefighters to detect critical temperatures in the critical minutes before they result in injury. If heat increases rapidly, the TST technology equipped suits generate a warning signal much more quickly than if temperatures are slowly rising, recognising that when things are heating up fast, firefighters need to exit more rapidly.

The TST microelectronics are durable and can be washed in a washing machine once the small computer/battery pack has been removed from an inner pocket. Beyond replacing the AA batteries, no further maintenance is required.

For more information, go to www.viking-life.com

Bristol Fashion



The ICP (Integrated Clothing Project) station wear range from BRISTOL UNIFORMS has been expanded to include optional colour combinations. The original grey and red design has been supplemented with a navy and red style to accommodate a growing interest in station wear from existing ICP PPE users who were looking to adopt a darker colour option.

The availability of the Navy Range is said to have prompted several existing PPE users to include station wear in their contracts. These include the UK's Defence Fire Risk Management Organisation (DFRMO), which has taken delivery of 1770 sets of the navy and red station wear. Also in the UK, Gloucestershire Fire & Rescue Service has begun its roll-out and Avon Fire & rescue will deploy its new kit later this year, while Norfolk Fire & Rescue Service will be taking delivery in early 2013.

For more information, go to www.bristoluniforms.co.uk

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First Strike Goes to Redmond Airport



OSHKOSH AIRPORT PRODUCTS GROUP has delivered the first production model of its all-new Striker aircraft rescue and fire fighting (ARFF) vehicle to Roberts Field, Redmond Municipal Airport (RDM) in Redmond, Oregon, USA.

The new generation Striker features what the company confidently describes as "advanced safety systems, delivering innovative fire suppression technology, unmatched chassis performance, and unsurpassed reliability and durability." The 6x6 axle configuration, with all wheel independent suspension and rear steering system is said to provide a smooth ride and excellent off-road capabilities.

For more information, go to www.oshkoshcorporation.com

Breath Easy

BREATHE SAFETY is promoting its Pure-air range of breathing air trailers as being suitable for a variety of applications within the petrochemical, nuclear and pharmaceutical industries where long-duration breathable air is required for working in hazardous atmospheres.

The company's air trailer can be used in areas where breathing air compressors are unsuitable due to explosion risk or where environmental quality of the air is likely to be poor. Constructed to conform with EN139/14594 for airline breathing apparatus, high pressure cylinder banks provide a guaranteed breathable air source that is reduced down and distributed to a control panel for either four or eight users.

The trailer comes in several sizes according to the duration and the number of user requirements. As standard, all units come configured for four users and are supplied with four breathing apparatus sets and hoses. All trailers have a main air supply and an emergency air supply; when the main air supply fails the emergency air automatically cuts in, maintaining air to the users, at the same time as an audible alarm activates to ensure that users exit the hazard zone to a safe area. A control panel, which can be removed from the trailer and be positioned remotely adjacent to the work zone to provide means of entry control for the users.

For more information, go to www.breathesafety.com



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New Horizontal Extrication Tool Holder

The latest addition to its Quic-Mount line of tool mounting solutions: the QM-ET-H2 horizontal extrication tool holder, has been unveiled by ZICO (Ziamatic Corporation). It comprises four separate components: two cast aluminium curved blocks and two steel angled brackets that, Zico claims, can be mounted in a wide array of configurations to accommodate virtually any cutter, spreader or combination tool.

The QM-ET-H2 is suitable for storing extrication tools in bumper "coffin" compartments and other spaces where height is restricted. Gravity keeps the heavy tool sitting firmly against the curved base blocks, secured in place by the heavy-duty nylon retention strap. High-strength angled brackets keep the blades/arms on the other end from shifting. When needed, the tool is simply unbuckled and lifted up off the shelf. When replacing an old tool, all that is necessary is to simply re-adjust the QM-ET-H2 components for the new arrival doing away with the need to purchase a custom holder for each tool.

For more information, go to www.ziamatic.com



New Mounting Option

Rescue reel manufacturer, CMW PRODUCTS, has introduced a new mounting option for its complete line of reels that comes with breakers, buttons and rewind guide installed. It can be mounted onto a front bumper or overhead



inside a compartment, placing the control buttons within easy access for rewind. The angled front guide support allows for clearance between lid and hoses when used in a front bumper application and installation time is claimed to be reduced because the reel is pre-wired, and requires no relays or large wire for operation.

For more information, go to www.cmwproducts.com

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UK Brigade's New Turn-out Gear

The West Midlands Fire Service in the UK has taken delivery of new firefighting turnout gear made from Hainsworth Titan fabric that incorporates DUPONT Nomex and Kevlar fibres. The Service has rolled the turnout gear out to over 2,000 firefighters across the county's 39 community fire stations.

The turnout gear is a double-cloth construction, with Nomex on the face to provide optimal thermal protection, abrasion resistance and colour fastness, and Kevlar on the back to provide strength, to offer what DuPont describes as: "exceptional heat and flame protection, chemical resistance, heat stress management capabilities and comfort".

The new turnout gear was manufactured by protective clothing specialist, Bristol Uniforms.



For more information, go to www.dupont.com

Newcomer to ARFF



UNRUH FIRE has entered the ARFF (Aircraft Rescue and Fire Fighting) market after many years of working with municipal and military fire departments by acquiring the Renegade ARFF vehicle line from Crash Rescue Equipment Service.

More than 100 Renegade ARFF vehicles have been sold in the last 10 years. Typically, they are built on Ford F-550 chassis with aluminium or poly bodies and are available in a number of configurations. One configuration consists of a Tri-Max high-energy cold compressed air foam twin-agent system, generating four times the foam of conventional systems. This system ranges from 380 litres to 1900 litres and is combined with dry chemical and utilises the Hydro-Chem technology.

A second configuration is a pump-driven system containing 380 litres to 2800 litres of water and 225kg of dry chemical also using the Hydro-Chem technology. Larger Renegade trucks, from 1890 litres to 2800 litres, for example, are available on a larger chassis, such as the International DuraStar.

For more information, go to www.UnruhFire.com

Self-retracting Lanyard

MSA's new Workman SRL self-retracting lanyard is being promoted as offering a lightweight, durable thermoplastic housing for years of dependable service. The RFID-enabled product simplifies product tracking and inspection, an integral, ergonomic carrying handle eases transport and installation, and a 180kg working capacity increases versatility.



Available in nine-metre length and a galvanised or stainless steel lifeline, Workman SRL is certified to ANSI Z359.1-2007 and CSA Z259.2.2 and meets all OSHA requirements. It does not require annual factory recertification and so lowers the cost of ownership. A swivel snap-hook with a load indicator at the lifeline end greatly limits twisting of the cable and alerts users that the Workman SRL has been involved in a fall.

For more information, go to www.msanet.com



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Courses are available to organisations, other fire & rescue services, emergency services personnel and individuals.

Our training programmes supply workers/operatives with the specialist knowledge and skills required to work safely and effectively in hazardous conditions.

The Academy offers courses such as:

- Confined Space (Full suite of City & Guilds 6150)
- Swiftwater Rescue in partnership with Rescue 3 UK
- Rope Rescue
- Working at Height
- Large Animal Rescue for vets (BEVA accredited) and fire & rescue services
- Breathing Apparatus/ CFBTI/ PPV (I)
- Suite of STCW95 Maritime Firefighting and BTEC Level 3 & 4
- Fire Safety/ Fire Awareness

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Specialist Rescue Training: Rope, Flood & River



Jessica King

Devon and Somerset
Fire & Rescue Service

The Devon & Somerset Fire & Rescue Service Training Academy is a leading UK fire and rescue training provider and delivers training to organisations, fire and rescue services, individuals and internal staff.

The Academy's Access & Rescue School provides a range of specialist rescue courses to enable delegates to work safely and effectively in hazardous conditions. Courses include large animal rescue and emergency training for vets and fire and rescue services, water rescue, rope rescue, confined space and working at height.

Water & Rope Rescue

The Training Academy is in partnership with Rescue 3 (UK), an internationally recognised training provider and offers a range of water and rope courses in the South West of England. The training is held at the River Dart Country Park in Ashburton, Devon and the Cardiff International White Water Centre in Wales.

Specialist Rescue Instructor Jon Bourn says: "We have delivered water and rope rescue training to other fire and rescue services and organisations

and have received excellent feedback on all of our courses". The courses are compliant with the requirements of the UK's Department of Environment Food and Rural Affairs (DEFRA) as set out in the Concept of Flood Operations Document for National Flood Response.

Water and rope rescue courses include:

- **Water Awareness – Chief Fire Officers Association (CFOA)/ DEFRA Level 1:** Designed to provide personnel who may be working near water with sufficient knowledge to be aware of the hazards created by this environment and develop an understanding of water rescue techniques.
- **Lifejacket Competent User:** For personnel who would normally wear and operate an inflatable life jacket as part of their Personal Protective Equipment (PPE).



Large Animal Rescue

The Training Academy delivers a Large Animal Rescue & Emergency Training for Vets course that is jointly accredited by the British Equine Veterinary Association (BEVA) and Devon and Somerset Fire and Rescue Service. The course incorporates a variety of learning techniques, including hands on rescue scenarios working with a life-size horse manikin.

The key outcome of the training is to provide delegates with the confidence to deal with trapped or injured large animals in a stressful situation. It also supplies vets with an understanding of health and safety at an emer-

gency incident, highlighting the potential risks for all those involved and how they can work together with the fire and rescue service. Dr. Gianluigi Giovagnoli from the Italian Equestrian Federation flew in from Italy to attend the latest course. He says: "Brilliant instructors, skills and hospitality and an excellent course".

During the course guest speakers who are experienced in veterinary medicine and emergency large animal rescues pass on their knowledge to the vets. Guest speaker Anna Hammond from Mayes and Scrine Equine Veterinary Practice has attended many emergency rescues. She says: "There is a huge amount of pressure put on vets at these incidents and this course raises awareness and reduces the amount of panic, in what can be a stressful and emotion driven situation." Anna goes on to say: "As an experienced vet who has attended a lot of these types of courses I am surprised by the high standard and quality of this one."

Neil Giddings who runs the course adds: "Experience has shown that not all vets are necessarily confident in working in this type of environment. Similarly our crews are not always familiar with the capabilities of vets at an emergency incident". With this in mind the course covers areas such as risks and hazards, incident command systems (ICS), cordon control as well as the equipment and techniques that vets may see employed by the services specialist rescue teams. The next course will run on 3rd and 4th July 2012 at the Fire Service Headquarters in Exeter.

A four day Animal Rescue (AR2) course including two days of animal handling and two days of animal rescue is available for fire and rescue services. Both courses will equip firefighters and vets with the knowledge and skills required to work together safely and effectively at animal rescue incidents. Neil says: "By training both vets and the fire services we can increase safety, resolve incidents effectively, minimise disruption and improve the prognosis for the animals involved".

Confined Space

The Training Academy offers a Confined Space Awareness course involving a mixture of theoretical instruction that is undertaken for legislation purposes and includes gaining an understanding

- **Swiftwater First Responder – CFOA/ DEFRA Level 2:** As well as being prepared to work around the water and undertake bank-based and shallow water wading rescues, one of the main roles of a first responder is to support the teams of swiftwater rescue technicians at an incident. To enable this, a responder will have the ability to self-rescue, skills in shallow water working, and basic rope work.
- **Swiftwater Rescue Technician (SRT) – CFOA/ DEFRA Level 3:** A four-day course intended for those who will be required to carry out rescues in a swiftwater and flood environment – such as, emergency services personnel, mountain rescue teams.
- **Swiftwater Rescue Technician Advanced:** This is a five-day course following on from SRT and is designed for personnel and teams dealing with advanced water or vertical access to water situations. Includes: search management issues, high-angle rope solutions for water rescue, and night operations.
- **Royal Yachting Association (RYA) Level 2 Powerboat:** A two day course to give students an understanding of power boating. This course focuses on boat handling & safety and includes elementary chart work. No previous experience is required.
- **Marine Radio Short range Certificate (SRC):** This one day course is for anyone who owns a fixed or hand-held marine VHF radio. The SRC is the minimum qualification required by law to control the operation of VHF and VHF Digital Selective Calling (DSC) equipment on any British flagged vessel voluntarily fitted with a radio. This includes both fixed and hand held equipment using International channels.
- **Management of Water and Flood Incidents – DEFRA Level 5:** Designed for non-water specialists who will be required to undertake a managerial role at water and flood incidents.
- **Rope Rescue Technician:** This five-day course provides an understanding of the concepts and techniques to enable small teams to undertake technical rope rescues.
- **Rope Rescue Technician Advanced:** This course builds upon the knowledge, skills and understanding covered on the technician course.

of hazards and risks, risk assessments, permits to work, method statements and safe systems of work required for confined space working.

This course also offers a good blend of practical demonstrations and exercises including equipment familiarisation. It teaches delegates how to pre-use inspect any equipment that they may be required to use. Students are then shown how to enter and exit a confined space safely and will receive a portfolio that they will complete during exercises. This portfolio will finally finish off with a summative assessment. Delegates will receive a certificate which is valid for three years, upon successfully completing the one-day course.

As well as Confined Space Awareness, the Academy offers the 6150-02 two-day City & Guilds Medium Risk Confined Space course. City & Guilds is the UK's leading provider of vocational qualifications and their suite of 6150 qualifications are the water industry standard.

The medium risk course is designed to provide delegates with the knowledge, confidence and skills to enter, exit and work safely within medium-risk confined spaces and the delegates are taught how to conduct risk assessments, fill out and use permits to work and understand safe systems of work. This course is in line with the National Occupational Standards (NOS) for working in confined spaces (NC1, NC2 and NC3). Lead Instructor Mark Shaddick says: "We want to do all that we can to ensure that we offer the highest quality training possible. Not only do City & Guilds verify our courses externally but we have enlisted QA Associates to internally verify us and make certain that we maintain the standard that allows us to be a City & Guilds accredited training provider".

The Access & Rescue School has recently received excellent feedback from the City & Guilds verifier to offer the full suite of their 6150 courses including 6150-02 medium risk, 6150-03 high risk, as well as the 6150-04, 6150-05 and 6150-06 Topman/ Non-Entrant Supervisor Awards. Mark says: "Our obtaining the full suite of courses through City & Guilds gives us a fantastic opportunity to provide quality training to local businesses in the South West and beyond". City & Guilds clarifies who the suite of courses are aimed at: "These qualifications are for anyone working in confined spaces, whether it is the classification of confined spaces, entering and exiting, overseeing or emergency rescue and recovery". Mark says: "We are also pleased to announce that new confined space courses are being developed for the renewable energy sector".

Working at Height

The Training Academy also offers working at height courses and training programmes include:

- **Working at Height Awareness:** This course is designed for people engaged in working at low risk where access is simple and anchor points are easily identifiable. The training provides delegates with a working knowledge of work restraint and fall arrest techniques for basic working at height activities.
- **Working at Height PPE Tester:** This course is intended to give delegates the knowledge, skill and understanding required to be a competent tester of personnel working at height equipment. People who are responsible for carrying out recorded inspections of personal working at



height equipment.

- **Working at Height Operator:** Provide delegates a working knowledge of work restraint and fall arrest techniques for working at height activities. For people who are required to work in a position at height, where traversing, climbing while remaining permanently attached, utilising dedicated anchors.
 - **Working at Height Supervisor:** Provides delegates a working knowledge of the site supervisor's responsibilities under the Health and Safety at Work Act 1974 and its associated regulations and codes of practice. Giving the delegates their accountability as site supervisor/managers. For site supervisors, managers and staff responsible for people working at height.
 - **Working at Height Emergency Rescue:** Provides delegates with a working knowledge of the site supervisor's responsibilities under the Health and Safety at Work Act 1974 and its associated regulations and codes of practice. Exposing delegates to their responsibilities as site supervisor / managers. For site supervisors, managers and staff responsible for people working at height.
 - **Ladders, harness, lanyard & PPE tester:** This course imparts the working knowledge the attendee requires to use a ladder, harness and lanyard safely for basic working at height activities. Additionally offering the knowledge and understanding required to be a competent tester of personnel working at height equipment. For people engaged in working at low risk where access is simple and use of fall arrest equipment is required and who are responsible for carrying out recorded inspections of personnel working at height equipment. Building contractors, maintenance operatives, scaffolders, window cleaners and theatre technicians.
- Devon & Somerset Fire & Rescue Service has recently finished building a bespoke training tower to assist in the delivery of current and future working at height training programmes. This tower will further improve the quality of training provided and enable the development of new and tailored courses.

IFF

Jessica King is Training Academy Project Support Officer at Devon and Somerset Fire & Rescue Service

For further information, go to www.dsfire.gov.uk/trainingacademy

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Aerial Laddering & Access to Aircraft



Jason Graber

ARFF Working Group

As highly trained and proficient aircraft rescue firefighters, hopefully we have thought through how we are going to access the aircraft during emergency situations?

Early on in my career, I was taught that the best place to access an aircraft is via an over-wing exit or an exit near the wing, as this is pretty much the centre point of the aircraft. Once inside, we have the ability to go forward or aft in the aircraft and hopefully we have hand-lines that are long enough to access to either the front or the back (or up in the case of the Boeing 747 or Airbus 380).

There is, of course, a need to know how aircraft doors work and operate. From the perspective of gaining access to the aircraft, this knowledge base is essential not just on the operation of the door, but also contributory factors such as what happens if this door does not disarm from the outside and the slide deploys. Have you ever thought about how much ladder (with proper climbing angle) is needed to access the main deck door on a Boeing 747 and be able to reach across and grab/rotate the handle? It is nearly impossible. I have never been fond of being on a ladder to

begin with and am terrified to think of having to make the transition from a ladder to the sill of a Boeing 747 or Airbus 380. Once the door is opened, the ladder can be flipped and placed in the doorway to allow for access.

Taking it to the Next Step – Literally

Many of us in ARFF departments both internally and externally have had the debate of accessing the aircraft via a ladder truck or tower versus an airstair. There is no right or wrong on the concept as every department has its own reasons for using a truck versus a stair. Many of the decisions are based on money and staffing as the key factors and many large airports have both while others have neither and must have contingency plans on how they will make access to the aircraft.

Access Considerations

It is my belief that regardless of the airport that you serve or work at, you should be prepared to

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handle the largest aircraft that comes into your airport (and everything else that does not come into your airport). If you can work around that aircraft, everything else should be streamlined. At the airport I work at, Washington Dulles International Airport (an E index airport, ICAO 10) we are on the hook for pretty much every kind of aircraft. The aircraft that I typically use as an example of this for our guys is the Boeing 747 for its fuel load, passenger capacity, and double decks.

In mid-April of 2010, we took advantage of the volcanic ash problem that plagued world travel for a week to train on wide-body aircraft and aerial laddering. British Airways provided us with a fantastic training opportunity and allowed us to use one of its Boeing 747-400s to set up and train personnel on laddering aircraft. This was an invaluable training opportunity, one that we rarely get, as aircraft for us are usually not on the ground long enough for use to come and take the time to do ladder company operations.

Depending the type of ladder truck you have (mid-mount or rear-mount) you are not going to have a lot of room to set up, especially when we consider the footprint of our ladder truck, any ground equipment that may already be on the ground, and the potential for evacuating passengers from the aircraft or already lying on the ground.

The ladder truck assigned to our airport is a rear-mount (2010 Pierce Arrow XT 100' Ladder Tower), therefore the truck is designed to be operated either over the rear or front. The first lesson learned for our personnel was to try and back the tower into place in front of the wing. The main reason for this is because personnel could work over top of the ground personnel and have access to the entire forward section of the aircraft and the wing. Backing-in allows for the entire length of the ladder to be used without having to go over the top of the truck. In addition, for smaller aircraft, the ladder may not allow you to lower the desired height of the aircraft based on the truck and its safety devices or height of the cab. Mid-mount devices allow for more "forgiving positioning" because of the position of the turntable.

By positioning between the two engines, the aerial ladder had a great deal of "scrub area" and was able to access the main deck doors, upper deck door and the wing area. The idea is to be able to get as much of the aircraft as possible with one "swoop". By positioning away in this fashion, it also allows for room for foam units to set up and

conduct their job specific tasks. Personnel working in the basket must be equipped with fall protection whenever working in the elevated position.

As the basket gets closer to the aircraft, the crew in the basket should take over the controls – they have the best view of where they are going and where they want to go and can quickly make adjustment if they need to back away. Once in position, the controls should be locked off so no inadvertent moves are made.

If our objective is to access an aircraft door, we must take into account some of the potential problems, the largest being the slide. Depending on the aircraft and whether or not the slide disarms from the outside, the basket should be positioned back away from the aircraft in the event of a deployment on the opposite side of the hinge. The rapid deployment of the slide could be enough to do damage to the basket and ladder and throw personnel out of the basket. It should not be trusted that any aircraft door that disarms from the outside always disarms from the outside – if the aircraft had a hard landing then all bets are off!

If our objective is forcible entry or cutting into an aircraft, the basket should be positioned over



top of the cut in area. If the objective is ventilation, then the basket should be positioned at the appropriate doorway and task established from there.

In closing, it is not assumed that these guidelines will work for every airport. We took advantage of an opportunity to establish a knowledge base for our personnel. If your airport does not have a ladder truck on it, you should be training mutual aid personnel in this skill. Bringing them onto the airport during an emergency and asking them to complete a critical task like laddering an aircraft could disastrous.

Jason Graber is Training and Educational Affairs Officer and Section 2 Sectional Manager for the Aircraft Rescue Firefighting Working Group at Metropolitan Washington Airports Authority

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Foam Delivery – Getting the Proportions Right



Bob Grieve

Delta Fire Australasia

Proportioning equipment plays an indispensable role in foam firefighting, but which type of proportioner is right for which task, and what are their key characteristics?

While the failure of a foam firefighting system would be serious in any circumstances, many foam systems are used to protect high-hazard, high fuel load and potentially explosive facilities, so the consequences of such a failure could be commercially, environmentally and, from a life-safety standpoint, nothing short of disastrous. Such critical applications exist in a number of industries, in particular in the chemicals sector, in the petroleum, gas and oil industries, in aviation, marine, the utilities and the mass transit sectors.

To perform with maximum efficiency, a foam firefighting system requires a number of pieces of carefully matched hardware to work together to deliver the desired combination of water and foam. If any one piece of equipment fails to perform, the effectiveness of the entire system will be seriously impaired.

Irrespective of the type of foam concentrate being used, firefighting foam is made up of three

ingredients: water; the foam concentrate; and air. The proportioning of the foam takes place when the foam concentrate is mixed with a flowing stream of water to form a foam solution. This is mixed with air – the term used is aspirated – to produce foam that is a stable mass of tiny, air-filled bubbles with a lower density than oil, petrol or water, allowing it to easily flow over the surface of the fire's fuel.

To achieve the correct proportions there are basically three methods of proportioning. These are known as balanced pressure proportioning, bladder tank proportioning, and around the pump or in-line inductors.

Balanced Pressure Proportioning

Of the various methods of proportioning, balanced pressure proportioning is typically used for fixed foam systems for inducing the foam concentrate into the feed water line. The method is so called because the foam concentrate pressure is

FOAM PROPORTIONING

“balanced” with the water pressure at the proportioner’s inlets. This enables the proper amount of foam concentrate to be reliably metered into the water stream over a wide range of flow rates and pressures. These systems are commonly used to protect petrochemical tank farms, oil delivery jetties, chemical processing plants, offshore platforms, aircraft hangars, and loading racks, because balanced pressure proportioning equipment is capable of continuously generating large volumes of foam.

There are essentially two types of balanced pressure proportioning equipment. One type is used in foam pump systems; the other is used in conjunction with bladder tanks – more on these later. Both though provide accurate foam delivery to firefighting monitors and foam deluge systems, which are used where rapid fire spread must be prevented.

Balanced pressure pump proportioning systems



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are often known more simply as pump systems and are used with atmospheric storage tanks that are usually made of polyethylene or glass-fibre.

When the foam concentrate is pumped from the storage tank to the proportioner, an automatic pressure balancing valve regulates the foam concentrate pressure to match the water pressure. Bladder tank systems use a pressure-rated tank that contains a reinforced elastomeric bladder to store the foam concentrate. Water pressure is used to squeeze the bladder to deliver foam concentrate to the proportioner at the same pressure. An advantage of the bladder tank system is that it requires no external power source and very little maintenance, which may be an important consideration when deciding which system to adopt.

Typically, the latest low-pressure-drop balanced pressure proportioners for foam pump systems are available both in standard and wide-flow designs that reflect the performance of proportioners currently available on the market. The wide-flow proportioner has an orifice, the area of which changes in relation to the flow, so ensuring the correct proportioning within a wide range of flows. Capacities typically span from as low as 100 litres a minute to a maximum of around 40,000 litres a minute, with a maximum operating pressure of 16 bar.

Significantly, they provide accurate proportioning of the foam concentrate irrespective of any variations in the flow or pressure, plus they incorporate the facility to site-adjust the proportioning over the full performance range, up to three percent. Standard balanced pressure proportioners are available with water inlet sizes spanning between 50mm diameter and 250mm, and wide-flow range proportioners from 100mm and 200mm diameter.

Robustness and the ability to withstand the rigours of often harsh or corrosive working environments is, obviously, a major concern. So

much so that many are now manufactured from high-grade corrosion-resistant bronze and stainless steel for reliable, maintenance-free operation.

Bladder Tank Proportioners

Bladder tank proportioners normally come in a similar number of design and performance options and are the ideal solution when upgrading an existing water sprinkler system to a foam/water system. Top-end pressure tanks are carbon steel and contain a butyl rubber bladder that contains the foam concentration, available either as a horizontal tank with capacities spanning from 400 litres to 25,000 litres, or as a vertical tank with a lower maximum capacity.

Bladder tank proportioners, which are also available in standard and wide-flow designs, offer similar capacities to the balanced pressure proportioners for foam pump systems, but with a slightly lower top limit. Water inlet sizes for the standard models again typically span from 50mm diameter to 250mm, while the wide-flow range proportioners for bladder tanks are available in 100mm, 150mm and 200mm diameter.

The proportioner is designed to fit between flanges. A distance equal to at least five times the water connection pipe's diameter is required before entering the proportioner, and the minimum distance for water pressure into the tank upstream of the proportioner is four times the pipe's diameter, with a maximum of ten metres.

Around-the-Pump & In-line Inductors

Although commonly referred to as inductors – used to induct the foam liquid concentrate into the water stream – both around-the-pump and in-line inductors are, in fact, proportioning units.

As well as being used regularly in marine applications, around-the-pump inductors are also

utilised on specialised foam trucks and fixed systems where a dedicated water pump is available. It is a foam concentrate proportioning unit that is designed for connection to a by-pass between the pressure and suction sides of the fire water pump that diverts a small proportion of the feed water flow, with a negligible effect on the fire water line pressure.

The stationary in-line inductor injects foam into a water stream. It can accommodate high back pressures, (up to 65 percent of the inlet pressure) which can increase the allowable distance between the foam injection point and the foam delivery device. Each in-line inductor is factory calibrated for a given fixed flow/pressure setting, with foam induction of up to six percent. A number of variants are available in with connection sizes for 25mm to 150mm and water capacities spanning from 100 litres a minute at 5 bar inlet capacity to 12,500 litres a minute at 16 bar. **IFF**

Bob Grieve is Managing Director of Delta Fire Australasia

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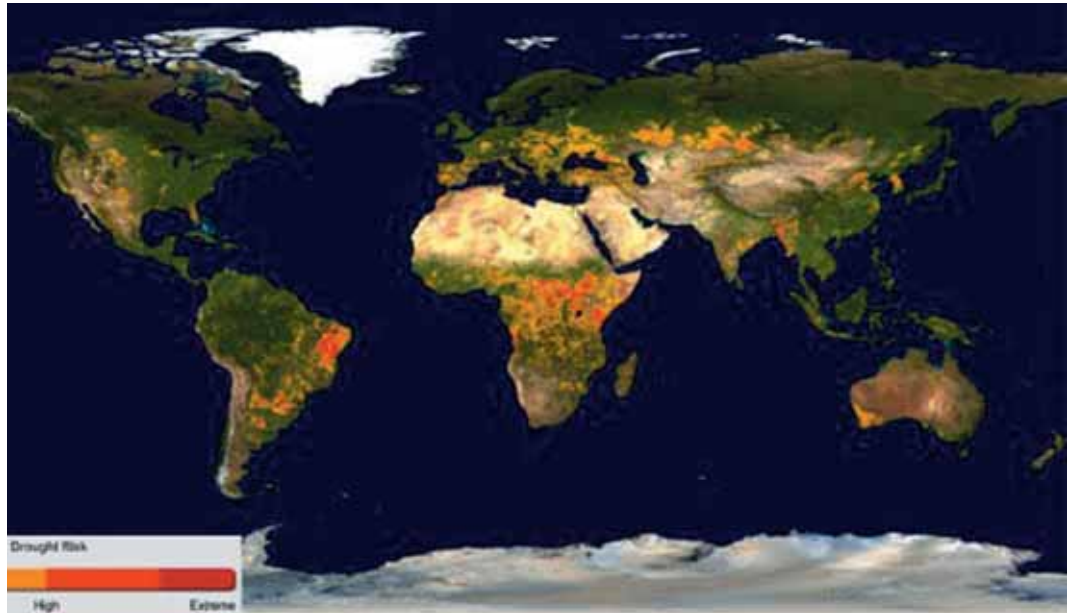
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The Benefits of Mobile Fire Protection Applications



Olaf Hempel

Advanced Firefighting

Portable fire extinguishers should be designed to reduce response time and increase control over a fire hazard at the earliest possible stage. Ideally, users will be fully trained firefighters responding promptly to every fire event with substantial safety and extinguishing equipment. However, to minimise collateral damage and reduce the risk to human life, it is often the case that staff or civilians within the affected area are the first people to fight a fire at the time of its outbreak.

Designed for first response and increased usability, portable fire systems are set to provide a highly effective method of fire-fighting. In this article, I will outline the benefits of portable fire extinguishers and the incorporation of water mist technology into mobile applications. But I will also consider the concerns surrounding their use, particularly from the perspective of safety, economic viability and the environment, and assess the benefits of mobile fire applications against each of these elements.

Industry Concerns User Protection

Being high-pressure systems, fixed firefighting equipment is often heavy and difficult to deploy, so it could be argued that it is the responsibility of fire protection product developers and manufacturers to ensure that access to portable fire extinguishing systems is available. But until recently, portable fire extinguishers have not provided the same level of fire protection as fixed and semi-fixed systems.

However, technological developments have dramatically improved the quality, versatility and effectiveness of portable fire extinguishers. In terms of usability, portable fire extinguishers can provide a simpler and less time-consuming

solution than fixed units, justifying the investment. Mobile equipment is now expected to be lighter and ergonomically designed to allow anyone of any size and strength to use it effectively, so it is important that this is the case.

Product initiation should also be relatively simple; the days of users facing an immediate threat and having to read sets of instructions before attempting to extinguish a fire are not an option. If a system is easier to use and manoeuvre, then response time for those in danger is reduced.

Environmental Design

It is of paramount importance that fire protection equipment uses available resources efficiently and sustainably, particularly as climate change and economic recession are high on the agendas of international decision makers in both private and public sectors.

The fire protection industry is not immune to these concerns, so it is vital that fire services and those requiring effective fire extinguishing systems are confident that maximum safety is being achieved with manageable economic and environmental costs.

One example of where the firefighting industry must integrate a sustainable approach centres round the issue of climate change. Due to the

obile Fire tions

global warming trend, areas across all five continents are facing moderate to extreme risk of drought in the next year (see map below). With this in mind, manufacturers must focus on finding low water consumption solutions to fire extinguishing products, without compromising on effectiveness.

One method of leveraging this initiative is to exploit the world's huge supply of sea water to relieve strains on freshwater supply. However, desalination is costly and not a perfected technology; huge amounts of waste, healthcare risks and environmental damage are potential side effects of this process.

Environmental and industrial damage is unfortunately an inevitable and often unpreventable bi-product of fire, so any system used to fight fires would ideally cause minimal damage to buildings, infrastructure and the natural environment. This is where economical costs come into play. Portable fire extinguishers can be an ideal solution when deployed in industrial buildings such as factories, warehouses and public locations, due to their mobility and usability.

Some extinguishers, particularly those using foam agents and chemicals, can leave lasting collateral damage in the aftermath of a fire that is difficult to clean up. Of course, the first priority is always to ensure that the fire extinguisher deals with a fire as safely and effectively as possible, but consequential damage causes added stress and cost to the parties involved.

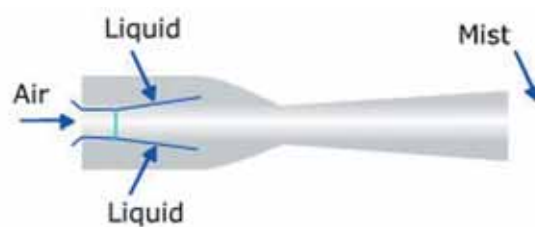
Benefits of Portable Fire Extinguishers

Water Mist Technology

The technology used in mobile firefighting equipment has improved dramatically in the past decade. Advanced Firefighting Technology (AFT), for example, has developed technology that allows mobile extinguishers to use water mist, making them more effective for rapid extinguishing, extensive heat absorption and higher lancing distances.

Using atomisation technology, water mist is developed using the kinetic energy of compressed air and mixed with the liquid in specially designed multiple nozzle systems. AFT's mobile products produce ultra-fine water mist of 150 microns, meaning that water droplets cover a far greater surface area than conventional water.

Water mist is a low water consumption solution and uses two of the most readily available natural resources: water and air. The significantly lower volume of water that is required to effectively fight a fire also ensures greater mobile protection for both first response units and endangered users at the scene of fire outbreaks. AFT water mist products are environmentally designed, allowing them to be used with saltwater and foam agents to produce compressed air extinguishing agents. This means that firefighters in coastal locations can



mobilise huge stocks of saltwater to fight fire effectively.

Applying Water Mist Technology

In terms of how water mist technology works when applied to portable fire extinguishers (see diagram above), the extinguishing agent, be it water or foam, is kept completely separately to the propellant gas tank, which provides the compressed air needed for the creation of water mist.

The air is then led into the water tank where the water is effectively compressed before it is transported to the extinguishing gun. However, the propellant gas is also transported directly to the gun via a separate tube. The compressed air meets the water mist to form the ultra-fine droplets at the valve attaching the extinguishing gun to the two tubes. In addition, when the compressed air leaves its tank, it is filtered through a pressure-reducing valve that reduces the pressure to 7.5 bars. This system allows the extinguisher to operate with extremely low pressure, making it easier to direct and control for inexperienced users.

The fact that the propellant air and water is kept separately, as well as the compression and filtration process, means that such mobile systems reduce water consumption levels and can also take advantage of a far greater yield of water than non-water mist applications. Not only does this mean that the water tanks are easy to fill, but as the water is combined with air, water consumption levels are lower. This means that the tanks do not need to be refilled as often as non-water mist systems. In terms of the air propellant tank, the compressed air is contained in a pre-filled canister, which simply has to be replaced when the gas has run out.

First Response

Portable fire extinguishers using water mist are ideal for use in a variety of fire-hazardous locations. Not only are they light and easy to mobilise, new technological solutions offer higher levels of versatility and usability.

These mobile systems use water mist for a dual-extinguishing effect, allowing for rapid cooling and fire blanketing, they also support dual mode firefighting and operate on low pressure, making them easier to direct and control. Dual mode fire fighting provides the option of jet and spray modes for either long distance or close range



extinguishing gun is between 16 metres and 18 metres, whereas in spray mode the maximum distance is reduced to six metres to seven metres.

Backpacks

Backpacks are mobile and ergonomically designed low pressure extinguishing systems that use water mist or CAFS for effective fire control. They are ideal for industry, roadside and offshore and marine emergencies, as well as for immediate response in public locations such as warehouses and stadiums.

There are two types of AFT backpack; one carries up to nine litres of extinguishing agent and has an empty weight of 13.4kg, while the other carries up to ten litres of extinguishing agent and has an empty weight of 12kg.

extinguishing. Jet mode allows the firefighter to achieve maximum lancing distances of up to 18 metres, while spray mode supports a lancing distance of up to seven metres.

While jet mode allows users to attack the fire from further away, spray mode provides alternative advantages. For example, smoke scrubbing – the effect of fine water mist droplets clearing the air – increases visibility and allows greater accuracy. Furthermore, radiant heat block, a fire cooling effect from the fine water droplets, provides additional fire protection to vulnerable users.

Industrial Protection

Mobile fire applications, particularly those that utilise water mist technology, are ideal for use in a number of industries and locations. As these fire extinguishers and CAFS support water as well as most available foam agents, they are suitable for rapid extinguishing of Class A and Class B fires. Primarily, products such as portable backpacks and fire trolleys are useful for fire trucks and emergency vehicles that must respond quickly to all kinds of fires at a variety of locations.

It is essential that any fire hazard is dealt with as efficiently as possible, and light, portable systems at the very least give first response units the chance to stop the fire spreading until heavy duty services arrive.

In terms of specific industries, portable fire extinguishers are ideal for offshore and marine locations, as well as industrial buildings such as warehouses and factories. These are locations of high fire risk, where reliable, speedy response to potential fire outbreaks is essential. Areas of dense crowds, such as stadiums, events arenas and race tracks, must also prepare for fire hazards as immediate response with effective equipment is crucial considering the large numbers of people.

In addition, the extinguishing agent tank can be filled with any type of water, including salt water, making mobile water mist applications particularly useful for offshore and marine locations, as well as general coastal industrial centres.

Products

Portable water mist systems are suitable to combat Class A and Class B fires and use the sophisticated extinguishing gun technology described above. The systems have a flow rate of 24 litres-a-minute and operate at temperatures between 5°C and 60°C. The extinguishing guns have a changeover time of two seconds from jet to spray mode. With jet mode, the maximum lancing distance of the



AFT Trolley

The Trolley is a portable low-pressure extinguishing system that can carry multiple extinguishing agents at one time and use sophisticated guns on a five-metre long hose. It is ideal for workshop, warehouse and building site fires that need to be handled quickly but may require a larger supply of water than a standard extinguisher or backpack. The ATF trolley carries up to 50 litres of extinguishing agent and has an empty weight of 56kg.



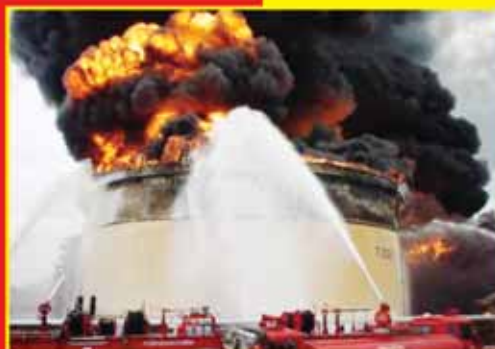
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- 99 percent of the world's ladder trucks do not reach above the 7th floor and will serve one side of the building. Response times average 15 minutes then five minutes to set up.
- Fire doubles approximately every minute.
- The Lethal Dose (LD/50) for a fall to a human is ten metres or about the 3rd floor.
- 69 percent of high-rise fires originate on the 4th floor or below.
- Each year an estimated 15,500 high-rise fires cause 60 deaths and 930 injuries.

Incredible advances in building safety and rescue techniques have occurred in the decade following 9/11/01 and it is not just chutes and ladders anymore. This industry is now formally referred to as "supplemental evacuation." It is not intended to replace any primary means of egress and stairs should continue to be the focus of all evacuation drills. This, however offers a second way out should one be needed. Call it "Plan B".

Quick History

In 2003 a group of manufacturers of escape devices came together to establish The Safe Evacuation Coalition. Each of them had different styles and types of devices but they all performed the same task, namely: solving the dilemma of getting people out of multi-story structures without involving the stairs.



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This obviously was not an easy task and had been revisited many times since the inception of high-rise buildings. But in this day and age these systems at a minimum needed to be simple to use for the untrained user, provide suitable protection and accommodate potential evacuees with physical impairments.

This group was not concerned about sharing technical information with their "competition" but instead turned out to be an ideal "focus group" for exchanging ideas from the big picture to the smallest technical detail about each other's products. After all, there is no "one size fits all" in this business and cooperation would be the best arrangement for them as well as the potential end-users. What was to become would change the world.

The National Fire Protection Association (NFPA) was under pressure following The National Institute of Standards and Technology (NIST) final report on the World Trade Centre disaster to seek current and future use of these devices. Specifically worded, it read:

(NIST recommendation #20)

"...NIST recommends that the full range of current and next generation evacuation technologies should be evaluated for future use, including protected/hardened elevators, exterior escape devices, and stairwell descent devices, which may allow all occupants an equal opportunity for evacuation and facilitate emergency response access."

The Safe Evacuation Coalition stepped in to assist on multiple fronts. Volunteering their individual training and experience, two members applied and were appointed to the NFPA Technical Committee on Means of Egress while others worked to establish two independent committees with The American Society of Testing of Materials (ASTM International) to create manufacturing and testing standards. These committees were responsible for the 2006 standards: "Standard Specification for Multi-Story Building External Evacuation Controlled Descent Devices" and "Standard Specification for Multi-Story Building External Evacuation Platform Rescue Systems (PRS)." In short, two different manufacturing standards for the current technologies that volunteered to participate, CDDs and PRSs.

Chute-style systems were unfortunately unable to come together on common ground to cooperate in the fashion required by ASTM and no progress was made. However, in my opinion several various styles of chutes offer other wonderful attributes to the supplemental evacuation community, are credible and safe to implement into scenarios where communities allow, and hopefully will be only a matter of time until they are recognised through the current governing bodies.

Simultaneously the NFPA was developing standards for guidance on the installation, maintenance and use of the equipment into the Life Safety Code and Building Construction Code Annexes. These standards were first published in the 2009 Life Safety Code and currently reside in

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the 2012 Code as "Annex B". Annexes are written in mandatory language but are not intended to be mandatory unless specifically adopted by the local Authority Having Jurisdiction (AHJ).

Controlled Descent Device Technology (CDDs)

Controlled descent devices or CDDs have been in use for decades, mostly in the fall protection arenas serving construction sites, military installations, maritime applications and oil refineries and platforms abroad. CDDs have proven to be a reliable source for descent from many structures and were reportedly utilised during the 1983 Beirut bombings that left 299 American and French servicemen dead. They are simple to use, require no power, have a long shelf life and can be deployed in a hurry.

What is unique about CDDs is that they look like, and work similar to a pulley, as one side goes down, the other side comes up for the next user. This process is repeated until all occupants have been evacuated. Often times a harness or protective "evacuation suit" is permanently attached to either side of the cable. Many CDDs utilise an eight-millimetre polysteel cable covered by a neoprene or rubber-style protectant to protect it against moisture and, ultimately, rust. Outside this cable is a kernmantle polyester sheath to protect the cable against abrasion, much like a rope. It is light like a rope and 15metres weighs just over 2.3 kilogrammes. It comes on a spool that rests next to the CDD itself and feeds out while in use. Some CDDs come in lengths up to 300 metres as the operation of the device itself is not changed by the length of cable.

Operation is pre-determined by the manufacturer



at speeds typically between one to two metres a second (similar to an elevator). The user cannot adjust this speed as they are designed to be utilised by an untrained individual (for example: your Momma... sorry, couldn't resist) Descent devices can be adjusted during operation, just not "controlled descent devices"; that is the biggest difference between the two types.

What CDDs do not do is give the user any sense of falling during descent; weight does affect the descent speed, but only slightly. For example, one manufacturer's CCD with a rated capacity of 180 kilogrammes conducted 75 test drops with a 180 kilogramme weight that produced an average speed of one metre a second. If, for example, you are a 48 kilogramme female you will probably average around 600 millimetres a second but you will likely be on the ground before the first emergency vehicles arrive, so you can pretty-up for the arriving firemen (wink). Alternatively, if you are that 180 kilogramme guy, catch your breath and help the firemen catch the hydrant on their way in! We will allow you first dib's on the television reporters when they arrive and need the full story.

Most CDDs are reusable and require little maintenance. A maintenance program may call for a monthly visual inspection with some cable being pulled back and forth through the unit annually. But make no mistake, it is probably more important for the occupants to conduct these monthly visual inspections so that they can be reminded of where the equipment is, that it still looks appropriate and be reminded of how to use it should the emergency strike that night.

Some CDDs require being returned for recertification every five years so the cable can be inspected for aging, inside the tamper-resistant



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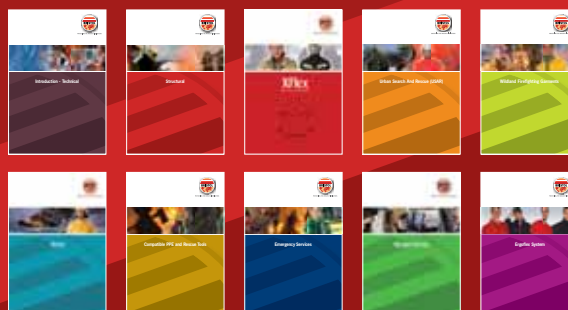
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HIGH RISE EVACUATION



housing can be inspected for rust and/or abuse and components replaced if necessary. Environmental conditions are the biggest enemy. Salt in the air near multi-story condominium installations just eats away at the steel components, but that is okay; it is simple and inexpensive to replace in the big picture. Typically recertification costs around \$400 for any repair once shipping is factored in.

Some manufacturers pair the CDD with portable or fixed-mounted anchoring systems to

allow for rapid “pre-planned” or speedy “unplanned” attachment to the structure. Fixed-mounted brackets allow for rapid deployment in multiple locations should supplemental evacuation become necessary. Rescuers can utilise portable systems as well as assist with fixed-mounted systems that are already present on the building.

Fire protective evacuation suits are also available and suggested, even if just a minimal number. These suits are oversized to accommodate adults

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with children in tow, their pets and valuables if necessary. They can also be used to assist an elderly, physically disabled or incapacitated victim. Evacuation suits are made of a fire-resistive, aluminised coating, with interior protection similar to that of Kevlar, and slide on easily like a pair of jeans. They are designed to be put on quickly, reduce the fear of heights, protect the user(s) and protect the evacuees should they need to descend directly past the fire floor on their way to safety.

This could be the perfect solution for the disabled, mobility impaired or elderly occupant to self-evacuate or be assisted should they not be in the physical health to descend dozens of flights of stairs. Alternatively these are also ideal for homeowner associations, nursing homes, hospitals, government facilities, embassies, air traffic control towers, first responders, construction sites, oil platforms and industrial facilities. These prove to be affordable to single families as plan to self-evacuate if necessary. Prices start about \$1500 for the CDD alone while complete systems start about \$3500.

Platform Rescue Systems (PRS)

Platform rescue systems move vertically along guides or other means on the exterior of a building and operate like an elevator. These systems are installed inconspicuously atop buildings and, during an emergency, automatically deploy and lower to the street level.

First responders board as they arrive and control the fire-protective cabins as appropriate for the given emergency. They can deliver up heavy hose loads, fresh air tanks and much needed supplies while evacuating people on the way down. This combination allows rescuers to arrive well rested to the upper floors safely from the outside of the structure. Hose streams can be directed to protect these cabins and being on the exterior allows for better guarantees of fresh air. These systems can evacuate dozens of people from multiple floors simultaneously. Some can hold up to 30 people per cabin and use up to five cabins. These have been adapted for uses in hospitals to accommodate over-sided beds from post-surgery or ICU patients as well as additional cabins to house wheel-chair bound evacuees.

Installation of PRS systems requires structural mounting to the roof and, typically, guides along the vertical face of the building. A motor and backup motor are usually installed on the roof as well. Prices start about \$800,000 but keep in mind this is a building-wide solution. Maintenance varies by system and each manufacturer would be happy to share that information.

Are we Safer?

Many buildings abroad are pre-planning for supplemental evacuation. Not only do they truly offer "two ways out" but many building owners believe that it is a great way to out-market other properties. Not to worry, retrofitting is not usually a problem for most buildings. These new styles of evacuation have been determined safe by experts along with the approval of the voting membership abroad and are subject to continued, thorough evaluation and guidance, which is being communicated through the standards.

Supplemental evacuation provides rescuers with solutions in a changing world of budget cuts. God

alone knows what we are faced with when we arrive on scene at 3am to a residential complex engulfed in flames. If we must dedicate our limited resources to rescue rather than extinguishment, nobody is left to put out the fire and we ultimately become civilians again with some extra tools.

Currently the NFPA Standards are available to be adopted in a format where Authorities Having Jurisdiction can enforce that buildings include these minimum safety requirements at zero cost to them. But more importantly, these solutions provide peace of mind to families by allowing them to plan a "second way out". Thank you for your service to your community whatever you may be protecting right now, especially for those who will never receive the credit they deserve due to the inherent security risk. We know you are there, we understand the situation and here to help 24 hours a day.

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Ryan Alles is President of
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Steven Pike

Argon Electronics (UK)

Finding innovative ways to enhance HazMat training in a manner that relates to today's threats and the array of detection equipment available to firefighters is a challenge. Here we explore some possible options that could make a busy HazMat instructor's life easier and HazMat training more realistic and engaging for the students.

For a firefighter HazMat, or Hazardous Materials to give the term its full name, historically related to substances that might be encountered as a by-product of an incident involving a road vehicle or railway transport carrying a hazardous cargo that had unfortunately encountered an accident, or perhaps a chemical release resulting from an industrial fire. Incidents involving radioactivity would typically result from a transportation accident or an incident at a hospital or industrial facility where the radioactive source was legitimately in use. Recent events in Japan have demonstrated the more extreme example of a release from a nuclear power station.

What the majority of these incidents have in common is that the fire department should (assuming the entity concerned has complied with all applicable laws) have either prior knowledge of the potential hazards and the threats they might encounter or, at least upon arrival, be provided with appropriate information or see a visible indication that a particular hazard is present.

Unfortunately the prospect of the deliberate release of a hazardous material also presents a potential threat that the firefighter has to consider. Such a release may have different forms:

- The use of chemical substances to take one's own life – at present first responders arriving at such unfortunate incidents are usually presented with HazMat warning signs placed by the victim(s). Not everyone undertaking such an act may be quite so thoughtful of others.
- A release occurring indirectly as a result of an aggressive act, the possibility of that release perhaps not being an element of the original plan of attack.
- An actual deliberately planned use of a hazardous material as a means of causing panic, physical harm or even death.

The possibility of a deliberate use of HazMat is bad enough, but the fact that the range of substances that might be used has been deemed to include radionuclides, biological and even chemical substances that were traditionally

o Enhance Exercises

reserved for the battlefield has resulted in firefighters having to procure and become familiar with a wide range of ever more sophisticated detection technology. The phrase “Jack of all trades, master of none” is one that has no place within the firefighting profession, as all have to be master of all trades, irrespective of how infrequently some of those trades may be called upon.

A further difficulty with chemicals, particularly the substances generally referred to as CW (chemical warfare) agents is that due to the nature of the technology employed by many of these detectors, just because they provide an indication that a CW agent may be present does not necessarily mean there is something present that is an actual CW agent. This is because there can be a tendency for such detectors to respond to non-CW substances and still receive an indication (so called false positives). It is fair to say that if a GC/MS (Gas Chromatograph/Mass Spectrometer) such as the Hapsite is used then you almost certainly achieve positive identification of the vapour present, however these are very expensive relative to the typical hand-held detectors available and therefore not within everyone detection portfolio.

Historically a useful side effect of such “false positive” responses has been used for training, in that relatively safe simulants were deployed to provide readings. However, as detector manufacturers improve the selectivity of their products, the potential to use such simulants for training is greatly reduced, not to mention the consequences of tighter environmental and health and safety regulations.

The trend to use multi technology detection techniques to further reduce false positives, be that by separate instruments such as for example the ChemPro 100, LCD 3.2e/3.3, or RAID-M100, all of which are IMS (Ion Mobility Spectrometry) based detectors with an AP2C/AP4C with is a flame photometry based detector or the more recent availability of multi-mode detectors that house multiple technologies within a single product also creates challenges for exercise provision.

While traditionally training in how to react to a CW type release was primarily carried out in the open because that was essentially where “the battle” and hence the threat was most likely to be, the modern threat is more terrorist related, and therefore the location of the incident is almost certainly going to be any area frequented by the



Camsin civil operative decontamination

public. Hence, there is an equal probability that this will be inside (for example, an airport, Government building, or underground rail transport system) as much as an outside location, such as a sports stadium or open-air music concert.

Indoor exercises have additional factors to be taken into consideration. An important element of training is for the responders to familiarise themselves with the actual facility concerned, especially if that facility is “sensitive” and perhaps one to which regular access for training is not possible. This can require that special clearance or permits are required if simulants are to be used. The fact that there is the potential for the training area to become a crime scene also means that using simulants should be avoided.

One means to overcome these problems, and also to alleviate the potential risk of damage to operational detection equipment during training, is the use of look-alike training simulators. These can now be produced to exactly replicate the look, feel and behaviour of the genuine detector. Simulation detectors can also offer additional advantages such as:

- No need for regular maintenance or calibration.
- No consumables.
- The ability to monitor the manner in which they are used, so providing the instructor and student with useful feedback.
- The integrity of actual detection equipment is maintained.

If the actual simulant source is electronic, rather than substance based this also has benefits:

- The exercise scenario can be quickly set up and confirmed.

Camsin CWA training system



- Environmental and health and safety concerns are eliminated.
- The scenario remains stable and under complete instructor control.

That the exercise scenario remains under the total control of the instructor is a very powerful feature. CW vapours vary in their volatility depending upon temperature. Air current and the wind also of course have an effect, however when setting out a scenario the instructor is trying to develop a set of circumstances that will result in a student or team of students experiencing a sequence of events typically some 30 to 40 minutes after the scenario has been set up. It does not help much if the simulants have dispersed so as not to be detectable upon arrival of the survey team.

In a typical scenario you may want, for example, vapour to be detected at relatively low levels of concentration when a slightly open window or a closed door is being checked with a detector. When that door is breached you might then require that the reading increases noticeably. Venting is another process you might wish to simulate whereby the concentration indicated within a room decreases when windows are opened to permit the escape of vapour. All of these features can be readily controlled if the appropriate simulation technology is correctly implemented.

A means to evaluate the operation of the detection equipment helps you to ensure that operators appreciate the importance of detection equipment preparation. Many detectors have what is referred to as a "confidence test" phase as part of their preparation. The test has to be carried out at the correct time after the instrument is turned on, and for the correct duration, otherwise the test can fail or the instrument can become saturated.

Some detection instruments also have consumables aside from batteries such as use replaceable sieve packs (LCD3.2e, LCD3.3, RAID-M) or sources for hydrogen generation (AP2C, AP4C). If such consumables are used is simulated there are clearly on-going cost savings to be made, however with appropriate simulator design it is also possible to ensure that primary and spare simulated consumables are available, and to also provide a means of

activity monitoring and provide feedback to ensure the student understands the correct procedure relating to the replacement of such consumables.

Reference was made earlier to the fact that CW detectors cannot always be depended upon to provide a 100 percent positive indication as to the identity of what maybe present, and that multiple instruments or multi technology instruments may be involved to overcome this deficiency.

With electronic simulation it is possible to represent specific substances and also known false positives for different instruments, there-

fore arranging for appropriate readings to be obtained on the training simulators during different stages of the exercise. At a basic level this might be to produce an indication of the presence of a nerve (G) agent on an AP2C or AP4C simulator (the real instruments in fact detect the presence of phosphorous within the G agent) and an indication of the nerve agent GB (Sarin) on an IMS based detector that has the ability, via an alphanumeric display, to provide an indication of the specific substance present (rather than just the class, i.e. nerve or blister). For a more sophisticated exercise simulation of the GC/MS process can be simulated.

Once the survey team returns from the scene they and any possible casualties that may return will then have to be processed and checked for contamination. This also can be electronically simulated, and once again because the instructor can control the manner in which the simulator responds to the simulation source, it is possible to simulate both full and partial decontamination.

While these examples relate specifically to CW agents, (which incidentally includes blood and choking agents) there is no reason the same simulation principles cannot be applied to the more usual multi -as and PID detectors used within fire departments.

There are, of course, limits to what can be accurately simulated when it comes to CW agents. However, simulation provides a means of ensuring that the operator is familiar with the use of detection equipment and also the procedures related to any readings that may be obtained during an incident. The advantages in being able to ensure that operational detectors are ready and available should they ever be required rather than being at the repair facility because they were damaged during training is also a clear benefit, not to mention the cost savings in repairs and reduction in consumable use.

Simulation should certainly not be considered as a substitute for live agent training, but is an excellent precursor so that you can ensure your students get the very best out of live agent training, which after all should be about appreciating the specific characteristics and behaviour of different substances, not learning how to use the detectors.

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Steven Pike is Managing Director at Argon Electronics (UK)

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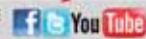
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Jan Suedmersen

@fire International
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Every year a number of earthquakes occur all over the world, causing massive damages and loss of life. The dimensions of these catastrophes quickly exceed the possibilities and capacities of many nations to generate quick and sufficient help. Especially when it comes to rescuing trapped victims, time is a key factor as the chances of surviving decline rapidly as every hour passes.

@fire International Disaster Response Germany is a recognised non-profit organisation, which specialises in the fields of wildland firefighting and search and rescue of victims after earthquakes. @fire's Urban Search and Rescue (USAR) team is available at all times and has an expected time of arrival (ETA) of 36 hours after an event occurs to make an immediate start on the search and rescue activities.

To enable a standard to be established for the work, and to ensure effectiveness and task organisation of the USAR teams, the International Search and Rescue Advisory Group (INSARAG) was founded in 1991 under the umbrella of the United Nations. In line with INSARAG guidelines, @fire has established a unit with the capacity defined as "medium". This requires the @fire team not only to be able to support itself for up to ten days in a civil disaster environment, but also to work in confined spaces and penetrate concrete walls and ceilings in order to rescue injured people. The team is trained

to also perform adequate medical treatment.

To build an effective SAR Team – a team that can make a difference between life and death for entrapped people – highly skilled and motivated personnel are needed that have day-to-day experience in responding to emergencies of all kind, plus they need three things: training; tools; and team spirit.

Training

The @fire approach to USAR Training is based on:

- 1 Nearly all members are active professional or volunteer firefighters in their communities with years of experience. This includes training for technical rescue, SCBA and Hazmat. Some are also trained as paramedics. Every @fire USAR team member can perform a multitude of roles, so the team size can be kept small.
- 2 On top of this, @fire provides specialised training for international deployments. Every member has to go through 20 hours of basic training in



international organisations, cultural awareness, personal hygiene, communications, safety and security, and base-camp operations.

3 After this basic training, every future member of the USAR team has to attend a 40-hour USAR technician's course that includes basic shoring, breaching and breaking, rope rescue and search operations.

4 After completing basic training, a variety of courses are on offer to obtain special qualifications, such as: search specialist, shoring specialist, USAR command, logistics specialist, heavy rigging, and swift-water rescue. In addition, a number of members who are specialised in their local fire departments, in such as diving and confined space operations, add those abilities to our portfolio of competences.

Because all of our members are volunteers and training has to be done in their free time, courses are very concentrated. All theoretical lessons are given to the attendees as pre-course work that will be tested at the beginning of the course. The course itself is mostly hands-on training and exercises.

To provide a state-of-the-art training under financial limitations following rules are adhered to:

- Training must be very demanding; the level of difficulty should be higher than is likely to be experienced in real situations.
- Training must be safe. It is very common worldwide to use abandoned or wrecked buildings for training purposes, but there are situations you just cannot simulate in a safe way in these buildings.
- Training should be reproducible to enable mistakes to be worked on and give the attendants the chance to make it better next time.
- Training should enhance the cooperation within the team. Teamwork along with crew resource management is another essential key to success, as the rescue work is carried out under enormous pressure, in a hostile environment, and with limited personnel.

Two examples to illustrate our approach to training:

Example: Structural Collapse Rescue Simulator

The structural collapse rescue simulator was developed by Paratech and @fire for demonstration purposes at Interschutz 2010 exhibition in Leipzig,

Germany. After the event it was dismantled and rebuilt at the @fire training centre.

The simulator is modular and its design can be changed easily, to simulate a confined space, where the rescuer can be confronted with the following obstacles:

- Concrete wall.
- Wooden wall.
- Brick wall.
- Armchair, washing machine or television set.

The rescuer has to cut, breach or break through it vertically or horizontally – cutting through a high-quality leather armchair is far more challenging than one might think! Additionally, one part of the simulator's tunnel system has a

movable base, seated on rollers. This floor has to be lifted and shored from the inside. This can be done with wooden shoring or a shoring system, but the use of a shoring system is much faster and is much more flexible.

The side walls are made of Plexiglas, so instructors can observe the whole operation from close-up and provide valuable feedback to the trainee.

Example: Handling of Heavy Loads

Inspired by the training done by FEMA-USAR teams, several heavy concrete obstacles are incorporated that have to be manoeuvred through, under or above. The heaviest of these objects is called "Big Moe", which weighs two tonnes.

To make the task more difficult, no power-driven devices are allowed, just manual tools such as manual jacks. To enhance teamwork, different "race tracks" are created so two or more teams can compete against the clock.

Tools

The efficiency of Urban Search and Rescue operations is mainly a question of having the right tools. But, as in every fire and rescue operation, the tools have to follow the tactics. This is particularly so in internationally-operating USAR team, where the work will mainly be in voids in concrete buildings. The tools have to be:

Mobile

Remember, there will be no big shiny fire truck from which you can jump and start to work. Every single tool has to be airlifted and brought to the scene by any possible means including helicopters, military trucks, pick-up trucks, horse carriage and – if everything fails – by carrying it. Invariably the team will up-load and unload the entire equipment four times, so every kilogram counts.

Efficient

The biggest tools are not always the best tools. They should be able to be held and operated in a confined space for a lengthy period of time. They should not produce too much vibration or dust, while still quickly cutting, breaching or

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lifting. And how these tools are driven has to be thought about. A concrete chainsaw with a small fuel-driven engine cannot be operated for a long period in an enclosed buildings. Electrical or hydraulic devices are mostly lighter, but need their own generator or pump outside the building.

Reliable

Tools have to function in circumstances that are a designer's nightmare. If they fail, the whole operation will fail. So, reliable tools are essential and, if possible, back-up key tools should be available.

There are many ways in which the tool cache can be structured and I would suggest to follow the INSARAG guidelines. Within these guidelines, the INSARAG external classification checklist clearly describes what is expected from the team and its tools. More detailed, but only a suggestion is ANNEX I: Suggested USAR Team Equipment List.

From the IEC checklist, the tools needed for rescue operations can be considered as one of the five elements of a USAR Team (the others being management, logistics, search, and medical), in line with the essential capabilities of a USAR Team:

- 1** Cut, break and breach through concrete walls, floors, columns and beams, structural steel, reinforcing bars, timber and building contents using "dirty" techniques (allowing debris to fall into the void space) or "clean" techniques (preventing debris to fall into the void space).

Typical tools for dirty techniques are sledge hammers, hand-held electric and gas saws with diamond blades, combi-hammers and breakers. @fire is using Hilti DCH 300 diamond cutters and TE 706 and TE 1500 hammers performing the "Chess" technique.

At the moment, we are evaluating a Lukas concrete crusher to make rapid and "dirty" entry. Clean Techniques can be done with concrete chain saws and/or diamond coring systems

- 2** Rigging, lifting and moving of structural concrete columns and beams as part of a de-layering operation utilising pneumatic lifting equipment, hydraulic lifting equipment, winches, hand tools or a crane (and possibly other heavy machinery).

For lifting, we are using hydraulic tools like the Lukas SC 350 E, airbags with a manual pump – as normally you cannot airlift pressurised equipment – and Habegger that comes in different sizes.

- 3** Conduct stabilisation operations of structural elements as follows:

- Cribbing and wedges.
- Window/door stabilisation.
- Vertical stabilisation.
- Diagonal stabilisation.
- Horizontal stabilisation

Beside tools to build wooden shoring, @fire has a modular shoring system to build interior rescue shoring.

- 4** Technical rope capability to construct and utilise a vertical raising and lowering system and to construct a system that allows for the movement of a load (including victims) from a high point laterally to a safe point below. This requires a set of rope rescue equipment that should be very easy to use.

Another important tool consideration is personal equipment. Our personal items at rescue operations comprise:

First-Line Gear (Stuff you should always have with you):

- Protective gear: suit, helmet, gloves, breathing apparatus, masks, knee protectors and work boots.
- Folding knife or multi-tool.
- Small flashlight.
- Examination gloves.
- Hi-energy snack.
- Pen and notepad.
- Official-looking identity card.
- Personal items such as a copy of your ID, money and medication.

Second Line Gear (Search & Recon Missions):

Second Line gear is used if search and rescue teams are sent out for area reconnaissance, assessment and light search and rescue operations. They are very mobile, only have a light tool cache with them, such as forcible entry tools, manual hydraulic combi tools and rescue saws. They should have the capability to be operated independantly when away from the base camp for 24 hours

- Load-bearing vest with numerous pockets, customised for your function within the team.
- Hydration bladder.
- Pens, markers and grease pencil.
- Weather-proof notepad.
- Field operations guide.
- Safety glasses and wipe rag.
- Safety goggles.
- Half-mask respirator.
- Flashlight.
- Multi-colour, high-intensity chemical light sticks.
- Disposable ear plugs.
- Small, personal first-aid kit.
- Snack food, such as energy bars.
- Food Rations for 24 hours.
- Spare batteries for your head lamp, lights, GPS unit, etc.
- Compass.
- Zip ties.
- Mini roll of duct tape.
- 15-metre-long parachute cord.
- Travel-size roll of toilet paper.
- Hand sanitiser.
- Sunscreen.
- Lip balm.

Jan Suedmersen is a USAR specialist with @fire International Disaster Response Germany

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Unifire's open shroud design allows our fans to be placed closer to the entry/attack point than closed shroud designs. Increases the effectiveness of PPV by approximately 20%. Provides more air flow and lessens variables.

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<u>Model</u>	<u>HP</u>	<u>Output (CFM)</u>	<u>Prop Size</u>	<u>Weight</u>	<u>Dimensions</u>
DS-3	4	8000	18", 2-Blade	53 lbs.	21.5" X 20" X 17"
DSTS-3P4-5	5	14800	18", 4-Blade	73 lbs.	22" X 21" X 17"
DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

ELECTRIC MODELS

<u>Model</u>	<u>HP</u>	<u>Output (CFM)</u>	<u>Prop Size</u>	<u>Weight</u>	<u>Dimensions</u>
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
EX18SP	2	12000	18", 2-Blade	110 lbs.	21" X 21" X 18"

DS-series comes without wheels and handle.

DST-series come with wheels and handle.

Electric fans come standard with DS-Series frames unless ordered otherwise additional charges will be applied.

* Blower is equipped with Smoke Cutting Light

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HazMat Team Tack Spillage Incidents



Peter Kirk

Saint-Gobain
Performance Plastics

The city of Roseville in California, just 30 kilometres north of the state capital, Sacramento, recently faced two major hazmat incidents separated by a mere 30 days.

Early one evening the driver of an 18-wheel tractor trailer was suddenly cut-off by another vehicle and forced into evasive manoeuvres, swerving left and right in the midst of a construction zone on busy Interstate 80. After hitting the brakes and stopping, he heard and felt his cargo tumbling and falling.

This was no ordinary cargo of garden-variety consumer or durable goods; inside were nearly two dozen 55-gallon drums of hazardous materials – heavily concentrated peroxides, hydroxides, hypochlorites, nitric acid and sulphuric acid. On checking the back of the vehicle the driver discovered that the barrels had been knocked over. They were leaking. He immediately calls 911.

First on the scene was Mike Bradley, a Type-One hazmat team coordinator and Fire Captain of Roseville's Engine Company One with his team. Immediately recognising the severity of the incident he requested the balance of the hazmat task force. This brought Truck 1 with Captain Greg James, Battalion Chief Kevin Morris, and several California Highway Police officers.

Confronted by a strong odour, and upon

reviewing the driver's Material Safety Data Sheets paperwork – which indicated the chemicals' high concentrations – Kevin Cullison, the Technical Reference Specialist contacted experts at the chemical company. His worst fears were confirmed. The chemists told him that it was a volatile cocktail of acids and bases that, if mixed, were prone to rapid chemical chain reactions. If it combusted there was the potential of a fast-moving firestorm of massive proportions.

"You mix one of the very concentrated bases with of the very concentrated acids and there's the threat for a caustic, chlorine gas cloud," said Bradley. The 313-bed Sutter Roseville Medical Centre and two major hotels were located a mere half-kilometre downwind; sitting ducks to a potentially toxic, life-threatening cloud.

Morris, Bradley and James led the pre-entry briefing to outline strategy and tactics – investigate what spilled, identify with certainty the spilled material, and determine the appropriate next steps. "Do we simply right the barrels? Are the barrels damaged, and do they require over-packing in a larger barrel? Do we transfer the

les Road & Rail

materials into a new, undamaged container? You really don't know what the best course of action is until you are in the hot zone," says Bradley.

The 11-member team decided to do a Level A entry with the two first responders (and their back-ups) protected by certified NFPA 1991 (Standard on Vapour-Protective Ensembles for Hazardous Materials Emergencies) hazmat suits, having breathing apparatus contained inside the lightweight, fully-encapsulated ONESuit Flash chemical protective hazmat suits. "Going into the truck, righting those barrels within that toxic stew, we didn't want any risk of exposure for our guys," Bradley notes.

Interstate 80 is a transcontinental highway that runs from downtown San Francisco, California to Teaneck, New Jersey in the New York City Metropolitan Area – the second-longest Interstate Highway in the United States. The spillage incident caused two lanes to be shut down; emergency lights were brought in to the staging area, and the two first responders entered the truck. They crawled over and around the heavy, leaking barrels, righted them one by one, and applied absorbents over the remaining chemicals on the base of the vehicle floor.

concentration, the highest concentration allowed by law – spewing into the air and over the sides of the shipping container.

"This is serious stuff – if it comes into contact with you it will burn you and it is very difficult to remove," says Bradley.

The crippled, spewing rail car (dubbed "a puker") was tugged to a dedicated emergency repair line spur at Roseville. Bradley's team and Battalion Chief Morris converged on the scene and were briefed by Ben Salo, the railroad's dedicated hazmat expert.

One can only guess what first responders at that incident were thinking. An incident in the same train yard nearly 40 years ago is part of local folklore. On April 28, 1973, 18 boxcars loaded with bombs en route to the Concord Naval Weapons Station began detonating in the yard after one of the cars caught fire. More than 6000 bombs detonated, injuring more than 350 people. The explosions caused damage to 5500 buildings.

In this latest incident, Salo's diagnosis was that the sulphuric acid contents blew out the rail car's frangible disk valve system, similar in function to a safety relief valve but not able to be resealed.

Roseville is no stranger to major hazmat incidents. 40 years ago 18 boxcars loaded with bombs began detonating in the yard after one of the cars caught fire. More than 6000 bombs detonated, injuring more than 350 people. The explosions caused damage to 5500 buildings.

Crisis contained and mission accomplished, private contractors moved in afterward to do clean up and safely repack the materials for shipping to their original, final destination. Describing the entire process as an eight and a half hour "adventure," Bradley gives voice to what legions of hazmat personnel know from training and first-hand experience: "Everything in hazmat is done in a very methodical fashion. No steps are skipped because the consequences of somebody coming into contact with those chemicals are really awful. So you make the plan, you make a back-up plan, and then you formulate a back-up plan to the back-up plan."

That level of precision and risk-abatement is certainly the case in terms of equipment and protective garment choices as well. Little did Bradley know at the time that another incident was lurking just 30 days in the future.

The Union-Pacific's Davis Yard in Roseville, the country's largest rail switching facility west of the Mississippi, is stretched out over a vast four square kilometres. It was here that a rail car's compromised pressure valve sent its contents – syrupy, sticky, caustic sulphuric acid at 98.2 percent

A three-person, Level B entry team prepped to enter the railcar and contain the situation by replacing the busted valve. They went with ONESuit Shield, a level B suit which shares its level-A cousins' lightweight and user-comfort profile but without the internal breathing apparatus.

"Sulphuric acid at that high concentration does not have a very high vapour profile so we didn't need the Level A," says Bradley.

The combination of experienced first responders, the proper protective equipment, and the team's monthly training drills, quarterly practice drills, and annual proficiency examinations paid off yet again for their safety and that of their neighbours. Faulty valve removed and new valve installed, and the crisis was successfully averted.

At the time, Bradley noted that his team had used "...other Level B suits in the past that were certified to NFPA standards..." but due to the flexibility and comfort of ONESuit Shield, he is replacing his older Level B older suits with ONESuit Shield. Given the recent unwelcome frequency of hazmat incidents in this small city of 110,000 people, one can hope that his orders have already been placed.

Peter Kirk is Market Manager at Saint-Gobain Performance Plastics

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Niall Ramsden

Liquefied Gas Firefighting

Over recent years there has been a massive increase in the transport, storage and use of liquefied gases for fuel in both industrial and domestic applications. For example, throughout Europe there have been new Liquefied Natural Gas (LNG) terminals built to import gas to supplement other supplies.

Most firefighters will be familiar with the special hazards associated with Liquefied Petroleum Gas (LPG) in small cylinders, such as those used for barbecues or patio heaters. In some countries such cylinders are very common because they are the main source of fuel for domestic cooking.

As LNG is introduced, and the applications of both LNG and LPG become more common and more storage facilities are built, it is appropriate to refresh knowledge on response strategies and tactics to be used for incidents involving such fuels. This situation has been recognised by the gas transportation industry and consequently a new training video aimed at incident responders has been developed by SIGTTO – the Society of Gas Tanker and Terminal Operators – in association with Videotel Marine International. I was a consultant on the panel of specialists that developed this article, which draws heavily from the script of the video for its content. Full details of the video's content and how to purchase a copy can be obtained from the website (www.videotel.com) and details of specialist training courses on LNG hazards can be obtained from admin@resprotint.co.uk.

What is Liquefied Gas?

Liquefied gas is carried all over the world for a variety of industrial and domestic uses, especially as fuel and chemical feedstock. The most common

liquefied gases used as fuels are:

- Liquefied Petroleum Gas (LPG), produced either from natural gas or from refining crude oil. Key LPGs are propane and butanes and mixtures of the two.
- Liquefied Natural Gas (LNG), produced from natural gas. Its main constituent is methane.

The gas is converted into liquid form by the producers to make it more economically viable to transport in bulk, as its volume is many times smaller than the vapour. For example, a single cubic metre of LNG produces more than 600 cubic metres of gas.

Fire Hazards from Liquefied Gases

The liquefied gases that are used as fuels are, of course, stored in containers and tanks specifically designed for the purpose and transported in bulk under controlled conditions. The probability of release and ignition is relatively low provided proper handling procedures are maintained, but it must always be recognised that uncontrolled accidental release can build up a large vapour cloud that can find an ignition source, particularly if the release is outside the confines of a storage facility and there are no ignition source controls.

The two most common types of liquefied gas fire are:

- **Jet fires** from pressurised liquid or vapour leaks, for example at pump seals and pipe flanges.

LNG & LPG FIREFIGHTING

- **Pool fires** where the liquid has been released and ignites before it evaporates. This normally occurs via a “flash fire” where vapour from the liquid spill reaches an ignition source and the flame travels back to the liquid pool. Even though methane, the main constituent of LNG, is a gas at normal temperatures and atmospheric pressure, a liquid pool can result from release of LNG because of the very cold storage temp (~-162°C).

Vapour cloud explosions can occur following release of LPG and LNG under some circumstances, especially where there is confinement and containment.

The type of incident associated with liquefied gases that gives most concern to fire responders is a BLEVE – a boiling liquid expanding vapour explosion. A BLEVE can occur in a flammable liquefied gas vessel when the heat of a fire surrounding it increases the internal tank pressure, particularly at the part of the vessel not cooled by the internal liquid. Eventually the vessel will fail – throwing fragments long distances. The tank contents are released to atmosphere, vapourising immediately and forming a rising fireball as the vapour is ignited. A BLEVE is normally associated with LPG but can occur with other materials under some conditions. Fire responders have been killed when tanks have BLEVE'd suddenly and they were too close.

Liquefied Gas Fire Hazard Management

The Flammable Characteristics of Liquefied Gases

Of course, it is not the liquid that ignites, but the vapours above it. The flash point of LNG and LPG

Liquefied gas	Flash point
Methane	-175°C
Propane	-105°C
Butane	-60°C

is relatively low as shown in the table above.

Vapour will ignite only if the concentration in air is within the ‘flammable range’. This is the range between the minimum and maximum concentrations of vapour (percent by volume) in air that form a flammable mixture. The flammable range is defined by the terms Lower Flammable Limit (LFL) and Upper Flammable Limit (UFL), although sometimes the terms Lower and Upper Explosive Limit (LEL and UEL) are used to mean the same thing.

Liquefied gas	Flammable Limits
LNG	~5-14%
Propane	~2-10%
Butane	~2-8.5%

Below the LFL the mixture is said to be ‘too lean’ to burn, and above the UFL the mixture is said to be ‘too rich’ to burn.

LNG And LPG Characteristics and Hazards

LPG and LNG have key differences that affect how they are handled and approached.

	LNG	LPG
Visibility	LNG generally burns with a very clean flame so it can be difficult to see. However, a vapour cloud that has been created from a liquid spill or pool is usually visible. This cloud is mostly water vapour condensed out of the atmosphere.	When LPG escapes into the air it becomes a gas which is heavier than air, forming a dense white cloud that will disperse according to wind conditions. Above this visible cloud will usually be an invisible layer of gas.
Heat	A LNG fire gives off more radiant heat than LPG, so it becomes more difficult to get close to the fire. It is the extreme heat of a LNG fire that causes most damage to people and structures.	A LPG fire generates twice as much radiant heat as an equivalent gasoline (petrol) fire, creating a high risk of burns to personnel and melting or weakening of nearby structures. (Volume for volume gasoline produces more total heat than LPG when burning but burns more slowly)
Buoyancy	At first, a LNG vapour will hug the ground but then become buoyant as it warms up above -100°C.	LPG is heavier than air, so it will flow downhill.
Vapour control	LNG boils off more quickly than LPG and has a higher vapour pressure meaning that it is more difficult to control vapour emission.	
Burnback	Flame spread through a LNG vapour cloud is slower than that of LPG.	If LPG comes into contact with a source of ignition, there may be an explosion with rapid burnback (‘flash fire’) to the LPG pool
Cryogenic hazards	As LNG is stored at -162°C, its cryogenic properties can crack steel plates and cause severe frostbite. It can also reduce the effectiveness of protective clothing and boots.	Propane, stored at -40°C, can cause similar problems to LNG when in its refrigerated state.

What to Do In Case of a Liquefied Gas Fire

A useful way of thinking about how to respond to a liquefied gas fire is the mnemonic **F-I-R-E**.

F – Find it.

I – Identify and Inform.

R – Respond.

E – Extinguish

Find

A fire is usually obvious to find, but detecting escaped gases before they ignite may be more difficult. Both LPG and LNG in their natural form are odourless and colourless (even though spills may form a white cloud, normally due to condensed water vapour in the air. However the visible “vapour cloud” will not represent the true extent of the flammable vapour cloud.

Identify & Inform

An alarm should be raised immediately a fire or gas leak is detected.

To manage a fire or un-ignited gas leak successfully, the source should be identified and the situation assessed.

Respond

Once the fire has been reported the source of the leak should be shut down, preferably remotely. The correct Personal Protective Equipment (PPE), including breathing apparatus if appropriate, should be donned and protective hoses run out and fire crews moved to their firefighting positions.

Extinguish

Extinguish or control? It may be that extinguishing the fire is not the best strategy as it could lead to a large vapour cloud and an uncontrolled explosion or another fire. A better solution may be to contain the burning and let the gas burn itself out. This will depend on:

- How much gas or liquid is likely to escape.
- Where it will disperse to.
- Wind strength.
- Whether it could disperse harmlessly.
- Whether the fire will heat vulnerable machinery, pipes, valves or storage that could create escalation.

When taking the decision, do not forget potential ignition sources downwind.

Extinguishing Fire

Methods of Controlling LNG & LPG Fires

Ideally, as already mentioned, the source of the leak should be shut down to cut off the fuel supply of the fire. The fire will then burn itself out and any jet flame will gradually get shorter as the fuel pressure drops.

If an extinguishing strategy is chosen then the most effective agent is dry chemical although of course this gives no protection against re-ignition. Foam is not usually very effective at extinguishing a gas jet fire and is of limited use on LNG or LPG spill fires because the high vapour pressure is usually sufficient to mean that vapours will continue to come up through any foam blanket. For LNG and LPG fires, high or medium expansion foams may be used to reduce vapour emissions from contained spills. Foam can also be used to control the size of the fire and reduce the levels of radiant heat.



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Carbon dioxide, inert gases such as nitrogen or other gaseous extinguishing agents can be used to extinguish gas fires but again they offer little protection against re-ignition unless the gas release is in a contained area, which means that the inert gas concentration remains after the agent discharge.

Water is the most effective medium for cooling and for reducing damage to structures or equipment exposed to liquefied gas fires. Water can also be used to disperse gas, but it does not normally extinguish fires unless the gas can be dispersed by water spray at high volume and pressure. Applying water to an LNG pool fire will increase the rate of evaporation and make it worse. It should be avoided at all costs. A water curtain will divert or dilute the gas vapour, and will act as a barrier against radiant heat.

Responding to Different Types of Fire or Leak

Release of Liquefied Gases

Gas release may result in 'flash fires' that rapidly burn back to the release source, if gas should leak and then migrate some distance and ignite. Even if it lasts only a few seconds, that may be enough to injure any personnel who have made the mistake of entering a gas cloud.

If possible, try to deflect the vapour cloud away from potential ignition sources using water spray curtains but never assume that they are 100 percent efficient – meaning that gas concentrations should be continuously monitored on the "safe" side of the water-spray curtain. Bear in mind that although a vapour cloud may be visible, the white area may not be the limit of the vapour and the *flammable* cloud may extend beyond it.

Procedure:

- 1 Make an initial risk assessment, and continue to assess the situation as it unfolds.
- 2 Stop all work and evacuate non-essential personnel.
- 3 Set up water curtains or sprays to try to disperse the cloud. Do not direct water streams into the liquid release as this will increase the rate of gas evolution.
- 4 Hose-handling teams should use water curtains to protect the deployment teams.
- 5 Isolate the liquid release source, if it is possible, safe and practical to do so.
- 6 Identify potential ignition sources and extinguish heaters and naked lights. Isolate electrical devices, but only if it is possible to do this before gas migrates to the equipment.
- 7 Use portable gas monitoring equipment to monitor the extent of the gas leak.
- 8 Where available, use foam to suppress the LNG vapour or LPG liquid release.

Caution!

- Do not enter the liquid/gas hazard area under any circumstances.
- Expect gas ignition at any time, even if there does not appear to be any ignition source.
- Be aware that if a large gas cloud ignites in an area that is full of equipment or plant an explosion may occur.
- Although ignited gas is often safer than un-ignited gas, deliberately igniting gas can be

very hazardous, because you cannot be sure how far it has spread and where it has pooled. This is therefore not recommended.

Pool Fires

All efforts must be directed to limiting the hazards from the fire as quickly as possible. Let the gas burn off if the fire is contained in an area where no critical equipment is at risk, as long as the source of the fuel can be isolated.

Procedure:

- 1 Stop all work.
- 2 Evacuate all non-essential personnel.
- 3 Make an initial risk assessment, and continue to assess the situation as it unfolds. In particular, assess the impact of flames or radiant heat impact on nearby LPG vessels, drums, tanks or gas-containing equipment as quickly as possible.
- 4 Alert personnel to the potential escalation hazard, and mobilise any external emergency plan to evacuate people, etc.
- 5 Activate any fixed water spray or deluge system to cool the affected and adjacent containment vessels, drums, etc.
- 6 Use water jets, sprays, screens or curtains to protect any radiant heat-exposed containment vessels, drums or plant.
- 7 Use foam if LNG is involved (and possibly also LPG) to reduce the flame and fire size and radiant heat.
- 8 Use large-volume water stream on to any flame-impinged area of LPG vessels, drums or tanks (if this can be achieved in a safe time and will not expose the fire responders to danger).

Jet Fires

Where the gas is released from a pressurised tank or line, the flash fire may burn back, leaving a gas jet fire at the leak source. The ideal response to a jet fire is to isolate it. If a jet fire could affect a containment vessel, drum or related equipment, the aim should be to reduce the heat input to such equipment and so prevent escalation.

Procedure:

- 1 Make an initial risk assessment, and continue to assess the situation as it unfolds.
- 2 As soon as possible, apply water in large quantities to the vessels and other liquid or gas-containing equipment in the area, NOT to the fire itself. Do not try to extinguish the fire with either dry powder or water.
- 3 Use water monitors, taking care when manoeuvring them into position.
- 4 If the jet fire is relatively low pressure, it may be possible to 'bend' it or to deflect it away from containers or equipment.

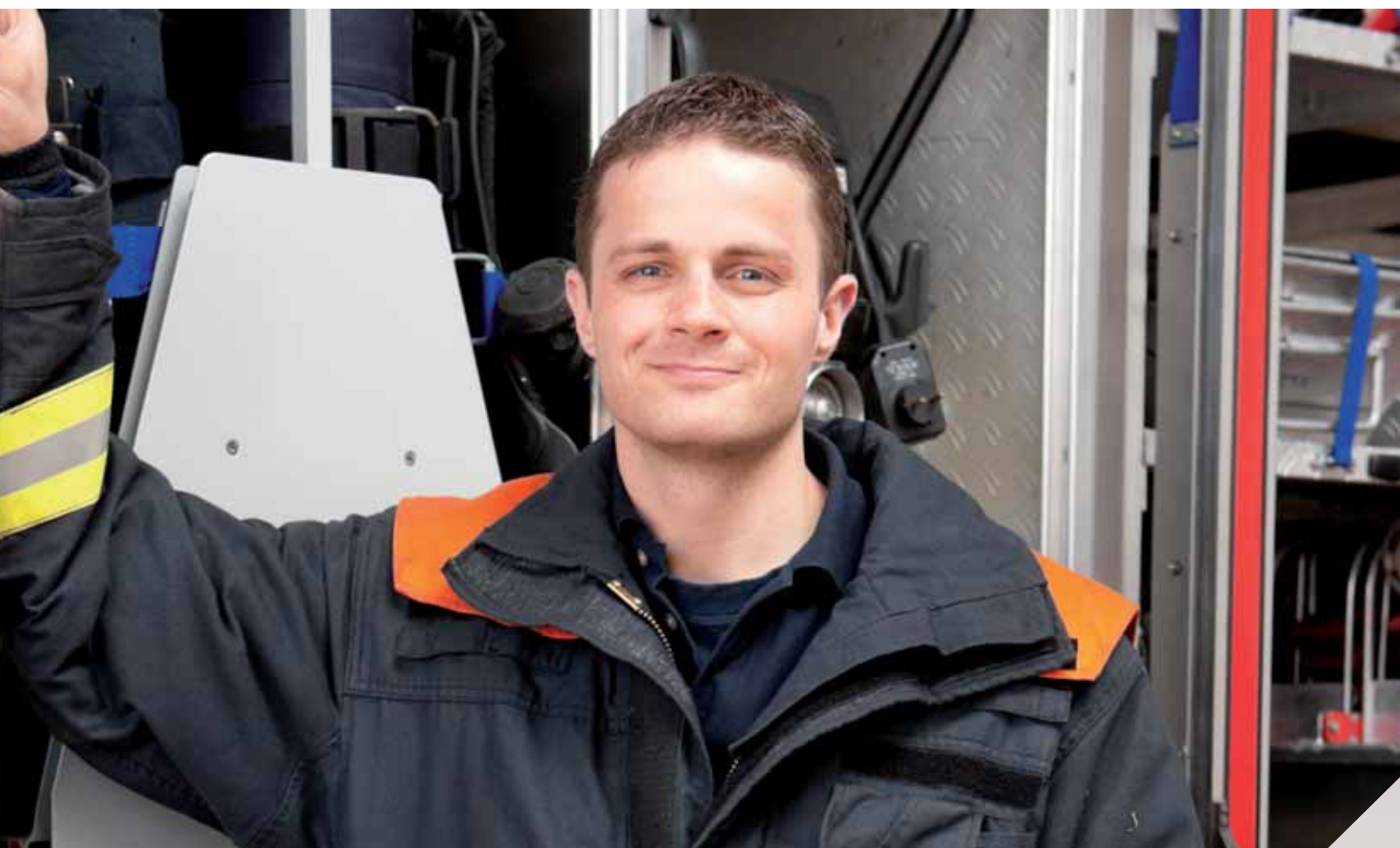
Emergency Training

While this article has briefly outlined some of the key issues in liquefied gas incident response nothing can replace specialised courses and "hot fire" training so any responders responsible for management of such incidents should attend such events that concentrate on the hazards of these materials. Although sometimes there is a lot of "scare mongering" about liquefied gases, especially LNG, in reality if the hazards and risks are known incidents can be handled safely and effectively.

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Dr Niall Ramsden is a
Director of Resource
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Radiological survey monitoring



The “m” in mSv Stands for Micro – Right?



Steven Pike

Argon Electronics (UK)

The Fukushima Nuclear reactor problems as a result of the Japanese earthquake and subsequent tsunami demonstrated only too well that just when you think matters cannot get worse – they most likely will, and even when 20 kilometres away, that does not mean your locality will not be affected. Unsurprisingly the incident has resulted in an increase in interest in nuclear emergency response exercises.

On a lovely warm sunny day in the southern USA the exercise coordinators prepare for the day's nuclear exercise. Argon had been asked to assist with the provision of simulation equipment for the duration, as the exercise controllers were keen to see if they could enhance the overall quality for the exercise and in particular improve upon the use of the traditional inject whereby the student is shown a piece of card or the modern version, and electronic notepad to represent pretend instrument readings.

The response team to be evaluated was assembled and then briefed about a problem at a fictitious nuclear power station that was 20 kilometres away and just happened to be upwind of the team's present location. The team then had to decide what action was required and what equipment was necessary in order to assess the potential risk posed to the local population.

Once the potential risk had been determined, they were to brief the local authority and make recommendations regarding the protection of

NUCLEAR EMERGENCY RESPONSE

Radiological survey team in line



those who may, or may not be at risk. Sounds fairly straightforward, doesn't it?

The exercise simulation requirement was discussed, which was as follows:

- A single plume to reach the training area 40 minutes after initiation of the exercise with deposition across the training area.
- The plume to comprise the following radionuclide's:
 - 137C.
 - 131I.
 - 90SR.
- The following simulation instruments were required:
 - Survey simulator.
 - EPD-Mk2 Dosimeter simulator.
 - SAM 940 spectrometer simulator.
 - Alpha simulation for RADECO air sample filter contamination simulation.

The simulation control system comprised a laptop with the Argon Rad PlumeSIM software and live field base station, which provided effective real time exercise control throughout the exercise area.

A local map to assist in planning the simulated exercise and also to aid tracking the students was obtained using one of the many freely-available map resources to produce a .jpg image of the local terrain, which was then calibrated using a feature included within PlumeSIM.

Each survey team was to be equipped with a survey meter, personal dosimeters, and a spectrometer, with the remainder of the students responsible for communications (hand-held portable radios were provided for this purpose), logistics and the collation and management of the data received from the survey team, as well as the generation of the hazard prediction plots.

The exercise commenced with the team being briefed about the problem at the local nuclear power station. At this point they were advised that the extent of the problem at the power station was unknown, and that they would be provided with further information as the situation developed.

So, what do you think you would be doing having received such news?

- a** Consider deploying a means of monitoring in case the information provided was inaccurate or out of date (hence the plume was closer than anticipated)?
- b** Chat about last night's television sport?
- c** Call your mum?

It is fair to say initially the equipment remained where it was prior to the exercise brief. After a little prompting, a decision was made to deploy a Radeco air sampling station. While the assembly of the sampler proved to be relatively easy, there was more than one view as to what airflow setting should be used initially during the warm-up period, and also the importance of keeping the exhaust of the generator used to power the Radeco a reasonable distance from the air sample intake. There was also some debate between students as to what was the ideal airflow rate to be set after the initial warm up phase.

The exercise coordinator then announced that a radioactive release had been confirmed, and that the estimated time of arrival of the release to the current location was 40 minutes. At this point the simulated plume release was initiated, the system configured to provide plume cover at the desired time over the exercise area. A preliminary trial run had been carried out to ensure that the desired readings were obtained in the appropriate locations.

PlumeSIM has a very nice feature that enables you to fast forward or pause the exercise, thus enabling the exercise controller to manage the staging of the exercise to suit the precise progress and status of the exercise participants. While we all know that, in the real world, nature takes its course in its own time, an exercise may be to evaluate, test, validate or educate or a mixture and as such sometimes it can be useful to "pause the exercise" to perhaps provide some gentle guidance to ensure the students get the very best out of the day's experience.

A portable player device is worn by each survey team member. The exercise control system automatically transfers the exercise to the player unit, which then broadcasts the simulated radionuclide activity to the allocated simulators based upon the student's geographic location. The students' movements throughout the exercise are monitored in real time and recorded for after-action review later back in the classroom.

The team decided to check the Radeco filter to see if any reading could be obtained. A simulation source had been installed on the inside of the filter paper holder, and when the simulation Alpha probe was offered up to the filter paper a reading noticeable above background was obtained. The reading was reported to the control cell together with the flow rate and the duration of the sample period, thus enabling the airborne activity level to be determined.

A survey of the local area was requested. A survey team of four comprising two team members each carrying survey simulators, (both generic survey simulators) and one team member with a SAM940 spectrometer simulator, with the fourth team member being responsible for radio communications. Two of the team were also wearing simulation dosimeters based upon the EPD-Mk2.

The areas in which the survey team would receive simulated radiation readings and to what

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level had been pre-determined by the exercise controller such that initial readings would be obtained typically 150 meters away from the command station, the requirement being to simulate readings as a result of uneven deposition. The survey team spread with a distance of ten meters between each of the three instrument-carrying members, the communications operative following a little behind the line.

As the survey team approached the "hot zone" readings started to climb above background level and were called in. This is where, from an observer point of view, the exercise started to get interesting. Remember it was a very sunny day. The team members were suitably dressed in protective ensemble and wearing respirators, and this combined with the bright sunlight made the displays rather more difficult to read than when in the nice comfortable classroom and not wearing a respirator.

The team member carrying the instrument would call out a reading. The communications operative would then contact the control centre and repeat the reading, quickly followed by the originator calling out "no, that's not what I said" and repeat the reading again. The respirators were not fitted with voice modules and so inevitably verbal communication was not straightforward. That was between two humans. When the message is then relayed across a hand portable radio by the communications operative also wearing a respirator the whole event turned into something reminiscent of a child's game of Chinese whispers!

Another interesting observation was confusion over units of measurement. It so happened that some instruments we set to indicate in Rem, while others were set to indicate in Sv/hr. The simulation survey meter reading rose to 10mSv/hr and the call went out "now reading 10mSv/v", each letter m, s and v being stated phonetically, (Mike, Sierra, Victor), which was duly acknowledged by the communications team member with the response "m – Mike stands for micro, right?"

The fact that some instruments were indicating different units of measurement also generated some interesting discussion regarding the relation-

ship between Sv/hr, Rem etc. While it is fair to say that there would most likely be consistency within particular groups as to the units of measurement used, serious incidents such as in Japan often result in multinational involvement with the inevitable preference for different units of measurement among different well-meaning groups.

The message to take home here is clear – those expected to use instruments of any type must be well practiced in being able to read and correctly interpret the actual display. Furthermore, they need to absolutely understand the significance of any readings they observe, and ensure these readings are communicated to any third-party accurately.

The display on the SAM 940 simulator (in fact a simulation probe attached to a real SAM940 detector) started to flash red, advising of a dangerous radiation level being present. Upon selecting “identify” the spectra was displayed together with the radionuclide list, which was correctly read out and reported. While the survey team stood discussing the readings suddenly a beeping was heard – one of the dosimeters has exceeded the pre-set dose alarm.

Like most dosimeters, the EPD-Mk2 is rather small and therefore has a small display, and in particular the unit of measurement indicator is very small and care is required when reading the display if wearing a respirator or level A suit (although in some instances such devices are worn inside the level A suit). While the dosimeter alarm was being reported to the control station a second simulation dosimeter also started to alarm.

The survey team completed its mission and returned to base for a full debrief. The group being evaluated then had to provide (and justify) their recommendations with regards to the evacuation or otherwise of the local population.

A number of visiting teams were to be put through the same exercise scenario, some of which comprised members who had not worked together before. This in itself highlighted some interesting problems, not least of which was differing levels of proficiency within the team, whereas if a team had trained and worked together previously, there was a stronger sense of organisation and competency.

Summary

The simulation system enabled a sophisticated scenario involving multiple radionuclides to be implemented with ease and repeated as and when required. Perhaps the greatest value was the ability to generate relatively high instrument readings such that most operators had never had to experience before. This in itself exposed the problems that can occur if these readings are not fully understood or incorrectly communicated.

The importance of training regularly as a team was evident, however as was noted when teams were made up from people who had not worked together before, there is great merit in replicating this situation in training, since you never know when you might be asked at a major incident to either join or command a team that until that point you had never worked with previously.

The exercise coordinators found it refreshing not to have to calculate the dose alarms and simulated dosimeter readings for the inject cards, as this was taken care of automatically by the simulation system.

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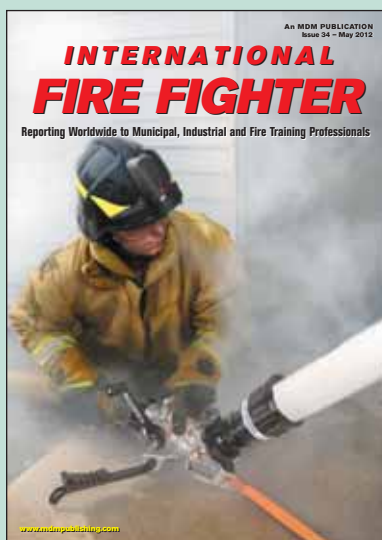
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ADVERTISERS' INDEX

Alert Disaster Control	4
Angus Fire	24
Australian Fire & Emergency Service Authorities Council	13
AWG Fittings	55
Bauer Kompressoren	52
Bristol Uniforms Ltd	37
Con-Space Communications	62
CTE Lift	36
Dafo Fomtec	IBC
Devon & Somerset Fire & Rescue Service Training Academy	14
Dr Sthamer Hamburg	25
Dynax Corporation	22
Emergency Services Training Institute (Texas A&M)	30
Evac Chair	35
Goliath Footwear	38
Haagen Fire Training Products	43
Iveco Magirus	18
Kussmaul Electronics	12
KV Fire Chemicals	29
Lukas Hydraulik	47
Mobiltex Escape Systems	30
MSA	57
On Scene Solutions	10
Paratech Inc	63
Plastika Akrapovic	2
Plastisol	20
Rosenbauer International	OBC
S.K. Rosenbauer Pte	21
Scott Safety	58
Skedco Inc	11
Super Vacuum Manufacturing	43
Task Force Tips Inc	IFC & 1
Tempest Technology	39
The Fire Service College	35
Unifire Power Blowers	49
Weber Rescue Systems	44
Yone Corporation	61



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A red Rosenbauer fire truck is shown at night, with its emergency lights flashing. Three firefighters in blue uniforms and yellow helmets are visible. One firefighter on the left is spraying a powerful jet of water from a hose. Another firefighter in the center is managing a large yellow hose connected to the truck. A third firefighter is on the right side of the truck. The truck's equipment, including a large red tank and various hoses, is clearly visible. The background shows a dark building with some lights.

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INTERNATIONAL FIRE FIGHTER

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G-Force Nozzles: The Inside Story

Based on a highly customizable global nozzle platform design, the unique G-Force series of fixed, selectable, and automatic nozzles combine over 40 years of Task Force Tips design innovation and experience into true next generation firefighting tools. Manufactured exclusively at TFT's USA production facilities, the G-Force series is supported by an extensive infrastructure of 24-hour technical service representatives, on-line documentation, digital video training library, exclusive product serialization and tracking capabilities, and a proven 5 year product warranty. Incorporating unique performance components such as a stainless steel slide valve, inlet debris screen and protective fog pattern choices, the G-Force series delivers high performance and rugged dependability.

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Contents



21-25

6-18 News & Profiles

21-25 Maritime & Shipboard Firefighting

27-30 Kitted Out

33-37 Support in the Wake of Disaster



33-37

38-42 UN USAR System Boosted

45-48 Structural Collapse - More common than you think?

51-54 Proposed ICAO Fire Test Changes Compromise Fire Safety



38-42

57-59 Truck Accidents - a True Challenge . . .

61-62 Latest ARFF Vehicles

65-67 Protecting Firefighter's Respiratory Systems



45-48

69-75 Decontamination - Making the Right Choices

77-79 Are "Ex Certifications" to be trusted?

80 Advertisers' Index



51-54



57-59



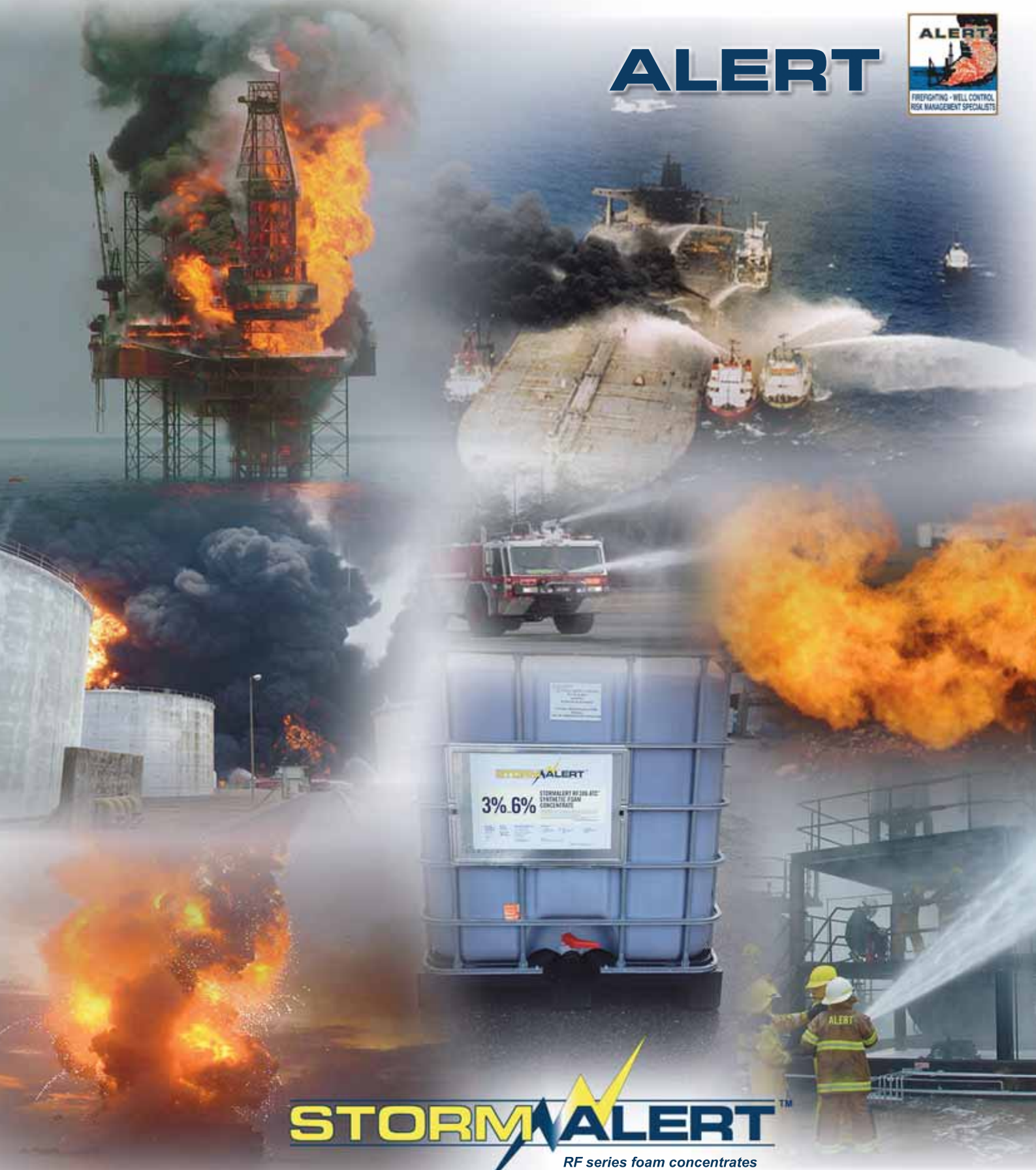
69-75



77-79

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Graham Collins

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What If?

Two things struck me when recently I was reading about the public hearings taking place in Japan on the Fukushima Dai-ichi nuclear disaster.

First, the designers and builders of the plant had clearly recognised a need to protect it from earthquakes and tsunamis; unfortunately, they had not taken into account, or possibly not accepted the risk of a tidal wave of that size and ferocity striking the shore. The second thing I noticed was that they appear to have also overlooked to take any steps in case their assumptions about the likely size and scale of a tsunami proved over optimistic; they had planned for a 5.5-metre wave but was struck by a wall of water more than 6.7 metres high. I particularly refer to the positioning of standby generators – that were intended to provide emergency power to the reactor cooling systems – in a part of the complex that would inevitably flood if the tsunami barrier was breached. They were positioned at ground level just metres from the sea front, and were among the first parts of the facility to be destroyed by the huge tsunami wave.

ciently advanced right now to come up with a reliable answer.

That is why I advocate a greater use of the “what if” approach. Those responsible for designing buildings, planning the environment, developing the infrastructure, creating the emergency response strategies and equipping those tasked with responding would, in my view, do well to consider this approach or, at least, ask the question more often.

Not that the question should be reserved solely for major natural disasters; it has an invaluable role to play when developing every emergency response strategy. Take a high-hazard petrochemical plant as an example. How many of them have the one-and-only emergency control centre located on site? Without an effective emergency control centre, incident management and the integration of all emergency services to achieve a coordinated

Do we ask the question “what if” often enough when making assumptions or assessments of risks or devising emergency response strategies? What if our predictions are wrong? What if things do not happen as we expect? Struggling to come up with answers in the middle of an emergency is not a viable option.

I raise these two points, not to appear to be smart after the event; rather it is to pose the question: do we ask “what if” often enough when assessing risks or devising strategies?

The problem with relying on predictions based on what went on in the past is that they are merely an average or approximation on what has already happened, providing only an indication of what might happen in the future – not what will definitely happen. That a particular volcano, for example, erupts every 500 years is nothing more an averaging of records that may go back only a few thousand years. This is not to say that brains far wiser than mine are not constantly addressing the problem. But ask any of them to predict the actual date of the next eruption of a particular volcano or the time, place and magnitude of the next earthquake or tsunami – our understanding of these things is simply insuffi-

response will be, at best delayed and hindered, more likely still, impossible.

So, what if the on-site emergency control centre is knocked out in an initial explosion? With every minute counting, having first to re-establish an emergency control centre is not a credible option for firefighters. And what if the site’s water supply is damaged by an initial blast; what if, as frequently happens, the site’s firefighting or fire suppression equipment is destroyed in the eruption?

Pondering answers to these, and many other “what if” questions, is certainly not something to embark upon when an emergency occurs. The nightmare scenario of Japanese engineers having to resort to car batteries to power essential equipment is not something to be repeated. Nobody can be expected to cover all of the emergency response bases, but anyone can, and should in my view, constantly ask “what if”.

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Confined Space & High Ambient Noise Firefighting

Firefighting in confined spaces and in conditions with high ambient noise presents some real challenges for firefighters on board naval vessels and cargo ships, as well as tankers, oil rigs and submarines.

A number of years ago The Royal Navy approached UK based helmet manufacturer, Helmet Integrated Systems Ltd (HISL), to work in partnership on a programme to develop a fire helmet that would both protect and assist navy personnel in the event of a fire emergency on board its vessels – arguably the ultimate in ‘high ambient noise and confined space’ conditions. The result of this programme was the Cromwell Echo fire helmet system.

With a long and varied history in the manufacture of protective headwear, HISL has become recognised as a genuine world leader in helmet technology. First established in 1924, the company now offers a range of not only Cromwell fire and emergency services helmets but also manufactures the world famous ALPHA brand of aircrew helmets, as well as Pureflo respirators used to protect industrial workers throughout the world and Argus anti-riot headwear found in use by police forces and prison services globally.

The Cromwell Echo helmet, which has been in operation with The Royal Navy for a number years, is undeniably a unique helmet system. Its integral cordless radio allows clear multi-way communications between controllers, team leaders and individual members of firefighting teams. Recent improvements to the system have also seen it become certificated as intrinsically safe.

Using a bone-conductive microphone positioned in the crown of the helmet, the system overcomes the communication problems associated with using traditional radio systems when operating in high ambient noise conditions. Furthermore, the integral radio system, mounted within the helmet itself, means there is no need for a separate waist mounted radio system or any trailing leads – ensuring the system is suitable for use in fighting fires, particularly in confined spaces.

A lightweight shell, with a simple rapid ratchet adjustment ensures the helmet suits most head sizes and a generously padded interior provides a



comfortable fit. Pads are easily removed for improved hygiene and maintenance and the helmets are compatible with most popular breathing apparatus and anti-flash hoods.

The system is even built to cope with applications requiring numerous firefighting teams. A single ‘controller’ can use a hand-held radio, which has a number of optional ancillaries, to communicate with up to 16 different teams, each communicating on a different programmable pre-set channel. Multi-charge stations, with a fast charge option, also allow for quick and convenient charging of helmet and hand-held radio batteries.

Other clever features include a time-out facility, ensuring channels cannot become blocked; an audible low battery warning and a smart override system allowing team leaders and controllers to transmit to and override firefighter communications.

Suitable applications, in both military and commercial arenas, include firefighting teams on board large ships and other vessels, oil tankers, cargo ships and submarines as well as oil rigs and other industrial applications where staff are trained to deal with fire in confined spaces and/or conditions with high levels of ambient noise.

With unrivalled communications capability the Cromwell Echo system is truly the fire fighter system of the 21st Century.

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For further information, go to www.helmets.co.uk

Quantum Leap



PIERCE MANUFACTURING has delivered four Quantum pumper vehicles to the San Antonio Fire Department in San Antonio, Texas. The department's frontline apparatus fleet now features 55 Quantum chassis vehicles including pumpers, aerial ladders, aerial platforms, and heavy-duty rescue configurations.

Each of the four new San Antonio Quantum pumpers is equipped with a 500hp EPA 2010 certified engine, TAK-4 independent front suspension, Command Zone electronics, seating for six firefighters, and side roll and frontal airbag protection. The vehicles also feature a 1900-litre poly water tank, a top mount pump panel, a Husky foam system, a Hercules CAF system, an EMS cabinet inside the cab, a rear vision camera, and a wide array of compartments with adjustable shelves.

"By standardising our fleet around the Quantum, maintenance and training are simplified, and this is an advantage in keeping our vehicles in service and on the job for our firefighters and the citizens of San Antonio," said Fire Chief, Charles N. Hood, of the San Antonio Fire Department.

For more information, go to www.piercemfg.com

New E-Cylinder Bracket



ZIAMATIC CORPORATION (Zico) has added the QR-E-1 strapless "E" cylinder bracket to its Quic-Release line-up. No straps are required with the self-locking QR-E-1; simply place an "E" cylinder in the bracket and press back through the latch to lock it into place. A heavy-duty back-spring holds the cylinder snugly against the latch and prevents annoying rattling. To release the cylinder, it is necessary to only slightly press it towards the back-plate, squeeze the levers to disengage the latch, and allow the back-spring to push the cylinder forward.

The QR-E-1 is made from durable, easy-to-clean stainless steel and is designed to hold standard aluminium and steel "E" gas cylinders with or without most regulators. The bracket's latch is plastisol-coated to protect the cylinders. The latch handles are also plastisol-coated for easy gripping and operation. As the lengths of "E" cylinders vary, the two components that comprise the bracket can be adjusted during mounting to accommodate specific cylinders.

The Strapless "E" Cylinder Bracket has three holes for mounting vertically, solo or side by side, and can fit within the dimensions of virtually all current "strapped" models for easy retrofitting.

For more information, go to www.ziamatic.com

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Powerful Tools for Structural Collapse Rescue

Urban search and rescue following an earthquake or other type of structural collapse, is difficult and challenging work. The safe and rapid removal of building material is vital to create space, locate victims and extricate them. Holmatro offers a wide range of tools allowing people to be rescued quickly, safely and efficiently.

Heavy Duty Concrete Crusher

The concrete crusher CC 20 (C) utilises Holmatro's CORE system, meaning that pumps can be positioned well away from the scene of operations making communications and casualty location much easier. The concrete crusher's heavy-duty design breaks the concrete without creating dust, ensuring a cleaner environment for rescuers and casualties alike. The crushing action also means that large thick pieces of concrete are removed with no vibration, greatly reducing the risk of secondary collapse.

Mini Cutter with Maximum Cutting Performance

The CORE system allows easy use of Holmatro's mini cutter CU 4007 (C) in conjunction with the concrete crusher as part of the rescue process. The blades of this mini cutter are optimised for both round and flat profiles, making it perfect for cutting re-bar during urban search and rescue and for the removal of pedals and headrests during vehicle extrication.

Thanks to its compact design and revolutionary i-bolt technology, the mini cutter is perfect for working in confined spaces. Its one-handed push-button operation allows a rescuer to work close to casualties while, at the same time, providing protection with their free hand.

Progressive Lifting with the Hand-Operated Power Wedge

Self-contained rescue tools offer versatility. The ability to work free from pumps and hoses allow work to be undertaken in a wider range of situations and challenging locations. Silent operation and no emissions mean a safer environment for casualties and rescuers alike.

The hand-operated Power Wedge HPW 4724 from Holmatro is very suitable for lifting collapsed structures after an earthquake or explosion. It can also be used for forcible entry applications, such as opening roller shutters, elevator doors and other automatic doors.

With an insertion height of only six millimetres it fits in extremely narrow cracks. Combining this feature with more than 25 tonnes capacity, this tool is ideal to create the initial gap required for positioning other lifting or spreading equipment such as lifting bags, spreaders and combi tools.



Concrete crusher, designed to quickly break away large, thick pieces of concrete with hardly any dust or vibrations

PowerShore for Shoring and Lifting

Holmatro PowerShore is a versatile and easy to assemble emergency shoring system, providing quick and reliable stabilisation for every rescue situation. It consists of a strut, extension pieces and, together with specifically designed heads and bases, can create safe areas in which to work. The load is safely secured by means of a manual or automatic locking system.

PowerShore is also available with integrated pneumatic or hydraulic lifting cylinders, allowing a combination of shoring and lifting operations. The system can be assembled in a minimum amount of time and virtually any object can be shored at various angles. Its flexibility makes PowerShore suitable for use in structural collapse and trench rescue incidents as well as for stability and lifting single cars or large goods vehicles at road traffic collisions.

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Flexible CBRN Training

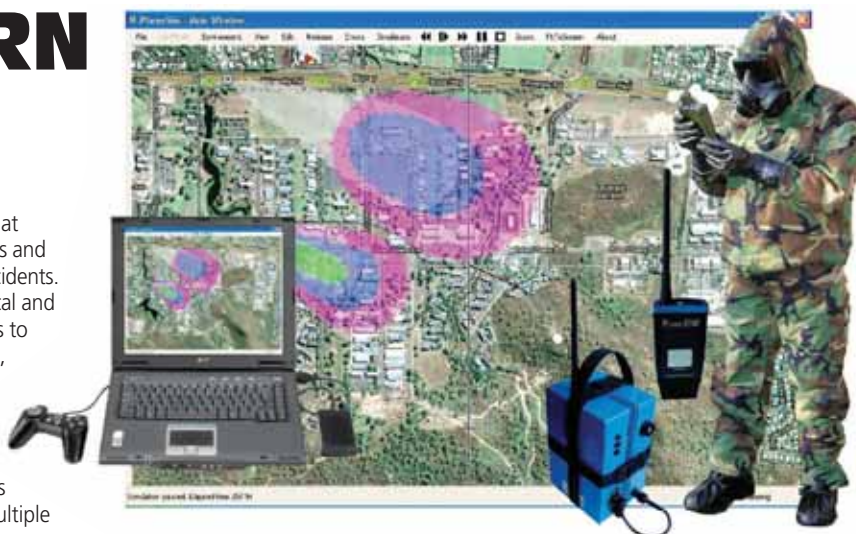
ARGON ELECTRONICS has launched the latest version of PlumeSIM CBRN/HazMat response training simulator that offers enhanced flexibility and ease-of-use in field exercises and table training for counter terrorism, HazMat or nuclear incidents. The PlumeSIM software, which is used with Argon chemical and radiological detector simulation instruments, enables users to plan exercises on a PC or laptop without system hardware, offering a portable simulation system with easy-to-use menus that can be swiftly set up and used to create a virtual emergency scenario.

PlumeSIM brings great flexibility to the planning of CBRN/HazMat emergency training exercises. It enables an instructor to plan a scenario that involves single or multiple releases of hazardous materials and offers the potential to define a series of release characteristics, such as duration, direction, persistence and deposition, from a variety of substances. The instructor setting the training exercise can even define the environmental conditions that would affect the movement and/or state of the virtual plume during the timespan of the operation.

Trainees can interact with Plume SIM in three modes: table-top mode, field exercise mode and post-event exercise review mode. Table-top mode offers the opportunity for trainees to navigate a scenario using a standard gamepad controller, offering a familiarisation with the simulation that enables trainees to gain more from the subsequent field training exercises. Field exercise mode enables students to investigate a training area physically, while PlumeSIM triggers readings and alarms on the simulation tools they carry by tracking their progress using GPS data relayed from personal player units. Finally, post-event exercise review mode enables all player movement and simulator activity to be reviewed by instructors and trainees at debriefing, maximising the potential for students to learn from their experiences.

In addition to its flexibility and ease-of-use, the modular Argon Plume SIM system is also cost-effective for end-users, since the number of simulation tools used can be expanded as and when budgets permit, and because all simulators can be used independently of Plume SIM there is no redundancy of equipment. Existing users of Argon detection simulation instruments are able to upgrade their equipment for use with PlumeSIM.

For more information, go to www.argonelectronics.com




Get Snapping

To celebrate the 40th anniversary of the development of the first hydraulic cutter, which revolutionised rescue work, LUKAS is holding a photography competition. The company is looking for photographs showing historic Lukas tools in action, firefighters, or personal memories that are associated with Lukas equipment.

The deadline for entries, which can be either photographs or digital shots, is September 28th 2012. The three most impressive photos will be selected by a jury and will win valuable equipment. The best photographs will also be published on the company's website from October.

For more information, go to <http://rescue.lukas.com/Photocompetition.html>


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Unmanned Wildfire Suppression



WASP MANUFACTURING has launched a new tool to help battle wildfires – the Wildfire Automated Suppression and Protection System or WASP, an automated wildfire protection system. The new equipment helps free up ground crews, can be deployed in the bush or anywhere there is an urban interface to protect homes and commercial structures. As long as it is hooked up to water, whether it is a lake or a fire hydrant, it can be started from any cell phone or laptop, anywhere on the planet.

Mounted on a trailer, the completely self-contained unit provides a 25,000 watt diesel generator, powerful pumps and over 900 metres of line with 30 sprinkler heads; enough to surround a major stadium like Toronto's Sky Dome with a 25-metre barrier of water. The Wasp can be towed to a location by most full sized pickup trucks, and be easily deployed by two operators within 45 minutes.

When firefighters are pulled out of an area for safety reasons, the Wasp can be left behind, where it can pump water continuously for up to five days without supervision. The Wasp can also be used to provide emergency lighting and power, and can move extremely large quantities of water great distances in flood situations.

For more information, go to www.waspswildfire.com

High-Flow Compact Pump



HALE PRODUCTS has unveiled the Qmax-XS, a new concept in compact, high litres-a-minute pumps that are capable of flows exceeding 11,500 litres-a-minute. Qmax-XS has a one-piece, compact body profile that minimises piping requirements and increases premium storage space on an apparatus. The design of the Qmax-XS allows it to be installed in a pump module as small as 860mm wide with manual valves or 700mm wide with electric valves. This gives firefighters the ability to knock down large fires, plus have body side compartment space for tools and EMS equipment.

Qmax-XS is engineered to go beyond the 8,500 litres-a-minute NPFA rating and exceed 11,500 litres-a-minute from a sufficient positive pressure water source along with an appropriate engine. Its double suction impeller with dual cutwater design reduces shaft loading for long life while increasing suction performance and efficiency. The pump's one-piece upper body minimises potential piping leaks, and makes maintenance and servicing easy.

Other features of the Qmax-XS include: 12 standard 100mm discharge ports; tank to pump connections; large suction inlets; and close-supported impeller. Additionally, it is available with three heavy duty gearbox options: The Hale G-Style gearbox, the Hale K-Style gearbox and the Hale GXS Gearbox.

For more information, go to www.haleproducts.com

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DS-3	4	8000	18", 2-Blade	53 lbs.	21.5" X 20" X 17"
DSTS-3P4-5	5	14800	18", 4-Blade	73 lbs.	22" X 21" X 17"
DST-3P4	5.5	14885	18", 4-Blade	81 lbs.	23" X 23" X 21.5"
DDST-3P4	5.5	14885	18", 4-Blade	82 lbs.	23" X 23" X 21.5"
DST-3P4-L*	5.5	14885	18", 4-Blade	85 lbs.	23" X 23" X 21.5"
DST-3P4-6.5	6.5	17000	18", 4-Blade	91 lbs.	23" X 23" X 21.5"
DST-9P4	9	17500	20", 4-Blade	115 lbs.	26" X 23" X 21"
DST-13	13	22000	24", 4-Blade	136 lbs.	30" X 28" X 24"

ELECTRIC MODELS

<u>Model</u>	<u>HP</u>	<u>Output (CFM)</u>	<u>Prop Size</u>	<u>Weight</u>	<u>Dimensions</u>
E18SP	2	12000	18", 2-Blade	85 lbs.	21" X 21" X 18"
E18P4	5	22000	18", 4-Blade	88 lbs.	23" X 23" X 16"
EB18SP	1.25	12000	18", 2-Blade	90 lbs.	21" X 21" X 19"
EX18SP	2	12000	18", 2-Blade	110 lbs.	21" X 21" X 18"

DS-series comes without wheels and handle.

DST-series come with wheels and handle.

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Gerry Zimmermann

Former Fire Chief (Kelowna Fires 2003)

Kelowna, British Columbia



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Firefighting Efficiency Boost

GRADALL INDUSTRIES has introduced what it calls the FA 50 strategic emergency response vehicle or SERV firefighting device, designed to be mounted on a fire truck to increase firefighting efficiency and safety.

The rugged hydraulic boom can telescope out 15.2 meters and uses a stainless steel fifth-man nozzle attachment to ventilate buildings by breaking through walls and roofs, as well as reaching through windows, rotating up to 220 degrees or swinging to the left and right. Once inside a burning structure, the fifth-man nozzle has 52 aqua-jet nozzles that direct a massive broken stream curtain of water, Class A or Class B foam into the fire.

Firefighters can control the FA 50 from over 60 metres away, using a wireless remote control device. This allows the firefighter to precisely position the apparatus with an easy-to-use system of controls on the belt-held remote device. For extra fire truck stability, the FA 50 is equipped with four stabilisers that are also controlled with the wireless remote. The stabilisers telescope out and down and can be positioned all at once or independently, providing short jacking capabilities.

For more information, go to www.gradallserv.com



Aerial Firefighting

CAYLYM TECHNOLOGIES INTERNATIONAL has recently carried out demonstrations of its new Guardian System that the company says introduces a new capability for fighting wildfires from the air, and particularly at night.



The system was built on the Precision Container Aerial Delivery System (PCADS) platform and now boasts a capacity in excess of 1,000 litres. This is over 15 percent larger in volume than earlier PCADS systems. Almost any cargo plane with rear ramps – including most commonly the C-130 Hercules military cargo plane and cargo helicopters – can use the system to precision drop the units that are approximately 1.2-metre cubed, using GPS 24 hours-a-day. At night, the system can be dropped using GPS precision from a safe altitude flying a level profile to the target.

The recent test drops in Arizona involved three guardian units, each containing 3000 litres. The saturated area was larger than a football field – over 4,000 square metres.

The Guardian unit complies with standard and internationally recognised Container Delivery System (CDS) protocols adapted by international and domestic air drop units.

For more information, go to www.caylym.com

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Angloco - Meeting the Market's Demands

Established in 1965 as Anglo-Coachbuilders Limited, Angloco built its first fire vehicle in 1974 making it by far the longest established builder in the UK. Angloco is family owned and operated with its headquarters near Leeds in the geographic centre of Britain.



Sustainable

Since entering the market 26 other UK builders have exited – mostly through financial collapse. Conversely, Angloco is independently recognised as the most sustainable and the best to partner with in this sector in the UK. Chairman, Bill Brown comments "Although 2011 was our 19th consecutive record year in a row for pre-tax profits and 2012 is already looking promising, we must keep broadening how and what we offer in order to maintain our continued growth."

Diversity

In service in over 50 countries on five continents, the core business remains the design and manufacture of fire-fighting and rescue vehicles with the most comprehensive and diverse range available: urban, rural and off-road; small, medium and super sized; municipal and civil defence; industrial and petrochemical; defence and airports. However, a key strength is Angloco's commitment to a broad activity base. Over the last three decades Angloco has extended its activities even further by acting as the distributor and service support center for other well-known and respected fire industry manufacturers. In the process, Angloco has become one of the UK's largest suppliers of fire and rescue equipment.

Recent achievements

● Foam

Angloco Ltd have been the UK distributor for Dr Sthamer – Hamburg since 2006 and were delighted to announce recently that the UK's largest airport operator, BAA have awarded a framework contract for Moussol FF, a completely fluorine free foam independently certified to ICAO Level B yet 100% biodegradable within 28 days. Moussol FF is already in use at Gatwick and Southend Airports in the UK and all of those in Norway and Sweden.

● Simulators

Angloco recently broadened its scope even further by acquiring Transtec Simulators Ltd adding live fire and other specialist training rigs to the range. Wayne Porter, previous owner who stays with the business and continues to lead the team comments "I'm delighted with the new corporate structure. It utilises my 20+ years in the Fire Service including time as a BAi & FBTi and my more recent experience designing and selling FBT rigs with the financial stability and long-term support of Angloco."

Transtec design and install fixed or transportable rigs to unique specifications – for local authorities, police fire arms units, defence forces, industrial, airport and offshore. Every level of build

For further information, go to
www.angloco.co.uk

PROFILE



is offered up to full turn-key including ecological impact assessments, water containment and treatment. A comprehensive range of maintenance, finance, outsourcing and flexible ownership packages are also now available including contract hire, lease, hire purchase and buyback. Thanks to the tie up with Angloco, all supporting equipment can now be supplied with the simulators including PPV, hoses, branches, PPE, fixed and portable pumps and other tools for a complete one-stop-shop.

Paul Hudson, Training Manager at EOS Risk received one of the first rigs under the new venture: "as a leading provider of off-shore risk management and training in maritime security this new training rig is a key asset. The rig is designed to facilitate maritime fire-fighting training to STCW95 as covered by the MCA and merchant navy requirements. Its two level – three floor design comprises four, realistically sized compartments including bunks, galley and engine room with the facility for diverse search and rescue techniques. The design is bespoke to EOS Risk requirements and we have got exactly what we wanted. Wayne has taken a hands-on approach from the outset even helping with tasks such as planning permission and sourcing ancillary equipment."

• Service

Angloco is committed to supporting products it manufactures and supplies anywhere in the world with 1/5th of its employees. Often exceeding expectations of support and back-up, a 24-7 emergency help-line for urgent problems ensures customers receive first-class response. Routine servicing and contract maintenance plans are tailored to customers' requirements, even for products not originally supplied by Angloco. On site, off site – around the world. **IFF**

Other key achievements –

- UK's largest contract for hydraulic rescue equipment – over 320 sets.
- Ranked by HSBC/*The Sunday Times* as 74th/2 million + fasted growing UK export companies.
- UK's largest contract for fire vehicle refurbishment – full re-manufacture of 88 6x6 ARFFVs.
- 10 year contracts worth over GBP £16M to supply all BAA airports with fire vehicles.





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Intelligent Fire Suits



Marine and fire safety equipment company, VIKING LIFE-SAVING EQUIPMENT has added technology to its range of fire suits that enable them to detect if a firefighter is in increased danger as things heat up. Every VIKING suit can now be ordered with the option of adding the company's thermal sensor technology (TST), which provides firefighters and those around them with clear warning signals as temperatures increase.

The company says that research shows that heart attack due to heat stress is the leading cause of death among firefighters in action, and that Viking fire suits equipped with TST technology are designed to reduce some of the factors that cause heat stress. Temperature sensors attached to two displays on the arm and shoulder indicate to firefighters and their teams critical temperatures, both inside and outside the coat.

Paradoxically, the company says that its technology is partially an answer to a problem that arises because today's fire suits have become so good at protecting their wearer. The heat insulating textiles in modern fire suits, together with other equipment, protect the skin so well against radiant heat that it is becoming a challenge for firefighters to detect critical temperatures in the critical minutes before they result in injury. If heat increases rapidly, the TST technology equipped suits generate a warning signal much more quickly than if temperatures are slowly rising, recognising that when things are heating up fast, firefighters need to exit more rapidly.

The TST microelectronics are durable and can be washed in a washing machine once the small computer/battery pack has been removed from an inner pocket. Beyond replacing the AA batteries, no further maintenance is required.

For more information, go to www.viking-life.com

Foam Approval



The UK's largest airport operator, BAA has awarded Dr Sthamer the Firefighting foam contract for its Moussol FF, a fluorine-free firefighting foam that has been tested and certified to pass the requirements of the International Civil Aviation Organisation's Level B standard. This included independent verification of the firefighting performance to the ICAO Level B standard at the CNPP Laboratory witnessed by UK CAA and BAA personnel.

Dr Sthamer's Moussol FF foam was developed to meet the stringent requirements of the aviation industry and BAA's environmental requirement to be 100 percent biodegradable within 28 days. This allows the airport rescue fire services to train with the actual foams they will respond with in real fire scenarios. The foam is already in use at London Gatwick and Southend Airport in the UK and all of Norway's and Sweden's airports and Finland's regional airports.

For more information, go to www.sthamer.com

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New Argus Mi-TIC Camera Sets a New Mini Standard

The new ARGUS Mi-TIC from e2v is the world's smallest high-resolution thermal imager. Designed specifically for firefighting and rescue applications, it provides ultra-clear imagery, has a superb dynamic range and clear visibility in extremely high temperatures without whiteout. Mi-TIC can also see very low temperature objects, making it ideal for USAR and confined space casualty searches.

The demand for thermal imagers that are smaller, lighter and less complicated to use has resulted in e2v launching the new Argus Mi-TIC, the world's smallest high-resolution thermal imager that delivers the best image quality and clarity of any personal imager on the market. The ruggedly engineered Argus Mi-TIC is extremely light-weight – it weighs less than 750 grams – demands minimal training, and enables firefighters to see in conditions of zero visibility, including complete darkness, and smoke-filled environments. It is intuitive and simple to operate and no user maintenance is required other than cleaning the imager after use.

No software is necessary to download images; downloading images is as simple as downloading from a digital camera. An SD card in the Argus Mi-TIC can accommodate more than four hours of recording and 1000 images.

The new camera uses Argus' advanced digital imaging technology and boasts a 69mm LCD screen – one of the largest format LCD screen on a personalised style thermal imaging camera in the world. It can be held comfortably in the palm of the hand (Argus tested it using every known brand of firefighter glove) stored in a jacket for quick access, clipped outside a pocket, clipped to a lanyard or hung around the neck. It offers a simple thumb-operated on/off function with a superb start up time of under five seconds. On-screen features includes: spot temperature crosshair and reading live temperature bar; battery indicator; temperature sensitivity; and date and time.



It comes complete with Argus' unique dual use desktop dock/in-truck charger unit. This multifunctional charging unit charges the Argus Mi-TIC thermal imager and a spare battery when placed into the unit and locked into position. A maximum of six charger units can be daisy-chained together.

Optional features of the Argus Mi-TIC include customer configuration that allows the user to set up the camera to work according to their own procedures and protocols, while tri-mode sensitivity allows temperature variations as high as 1832°F (1000°C) and as low as 40°F (-40°C) to be imaged.

The dynamic range of the Argus Mi-TIC means that a casualty located in a very high temperature environment can still be seen by the camera's user. "One button" camera enables the user to set 'black box' recording on/off, while "three button" camera permits the user to set the function of the additional buttons for image capture, image freeze, switch application colour mode (firefighter and search/overhaul), and digital zoom. A whole raft of off the shelf accessories, such as a laser pointer or flash light, can be attached to the picatinny rail at the top of the camera. Thanks to the design of its quick-fit sun shroud, the camera can also be used outside in bright sunlight.

The new Argus Mi-TIC thermal imager incorporates temperature and compression safe lithium phosphate battery technology. There is a two-hour and four-hour battery option and the camera's battery pack allows it to be powered by off the shelf AA batteries, enabling the user to use the camera in an emergency if the rechargeable batteries have already been run down.

IFF



For further information, go to
www.argusdirect.com

1000th Panther

To mark the production of its 1,000th Panther vehicle, ROSENBAUER handed over three trucks to the London Stansted, Düsseldorf and New Doha International airports. The vehicles – the Rosenbauer flagship fire truck – were a Panther 6x6, a Panther 8x8 with short wheelbase, and a Panther 8x8.

The Panther series incorporates trucks with two, three and four-axle chassis, permanent all-wheel drive, engine capacities of 500hp to 1,260hp and tanks with volumes of 6,000 litres to 19,000 litres. A difference of four meters and over thirty tonnes separates the Panther 4x4 ATA, which is the smallest version and suitable for air transport, and the Panther 8x8 CA7 with long wheelbase, which is the largest model in the current line-up.

Rosenbauer delivered its first ARFF vehicles in the mid-1950s, followed in the 1960s by large airport pumpers carrying several thousand litres of extinguishing agent. With the arrival of the first Boeing 747 jumbo jet in the 1970s, airport fire trucks increased in size and, in 1984, Rosenbauer unveiled the SIMBA 8x8, which to date is the company's largest and most powerful vehicle.

The Panther is now in service in 81 countries and, according to the company, is by far the most frequently employed ARFF vehicle at international airports. The top ten markets for the Panther are



Australia, Brazil, China, Germany, Great Britain, India, Japan, Saudi Arabia, Spain and the USA.

Every Panther meets the most important standards and safety regulations for ARFF vehicles, including those of the International Civil Aviation Organization (ICAO), the USA's Federal Aviation Administration, Germany's AdV and the NFPA.

For more information, go to www.rosenbauer.com

Wildfire Communication

ZETRON communications control technology has been at the centre of operations to fight a wildfire and evacuate residents from a remote area of Tarragona in north eastern Spain. The fire, which took of the town of Rasquera was extinguished only after around the clock efforts by firefighting and civil defence teams supported by aircraft dropping water on the flames. The blaze scorched more than 3,000 hectares of scrubland and pine forest and forced 52 people from their homes.

The emergency was the latest deployment for the Cataluña Mobile Civil Emergency Response Centre, a specially equipped vehicle with technology that includes Zetron DCS-5020 digital consoles. The system enables operators to manage up to 30 different radio and telephone channels through a touch-screen display.



During the emergency operators used it to coordinate the safe movement of people while continuing to direct the firefighters and aircraft as they tackled the blaze.

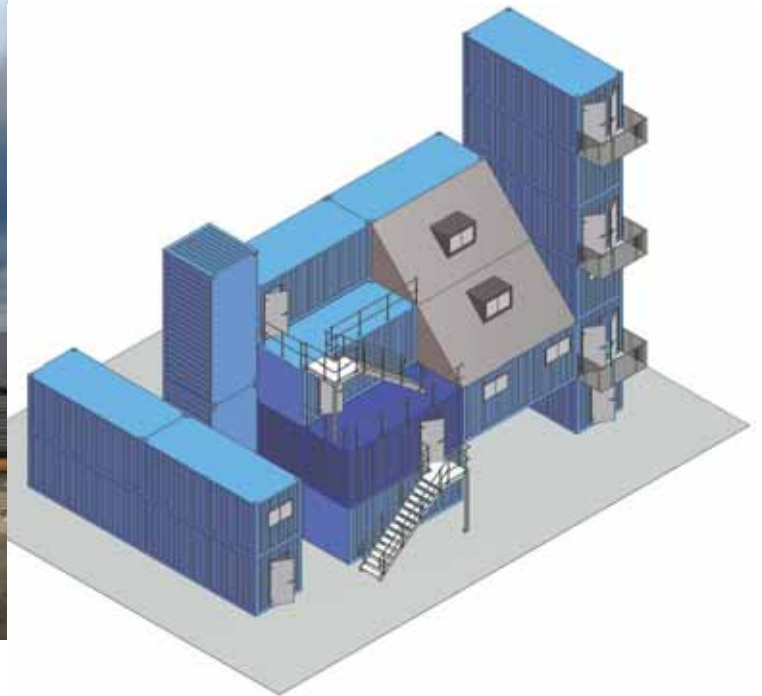
The Cataluña emergency response vehicle is one of 12 across Spain equipped with Zetron communications control systems. Each vehicle is on permanent standby, ready to play a crucial role should

any of the country's regional governments have to respond to a civil emergency or disaster of any type.

Zetron's DCS-5020 digital console is deployed widely throughout the world in public safety, transportation and utilities control rooms, but as the Spanish deployments show, it is also at-home in mobile applications. It enables small to medium sized operations' control rooms to combine telephony with both digital and analogue radio control, supporting combinations of up to 30

resources including up to 16 screen-based operator consoles. Distributed processing gives the DCS-5020 flexibility, scalability and robustness, delivering the high degree of resilience required for mission-critical 24/7 applications.

For more information, go to www.zetron.com



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Visit www.dsfire.gov.uk or email trainingacademy@dsfire.gov.uk



Maritime & Shipboard Firefighting



Jessica King

Devon & Somerset Fire
& Rescue Service

It is estimated that every year in the UK alone nearly 100 marine vessels are destroyed by fire. The result is lost lives and/ or property and potentially thousands of pounds in lost revenue and business.

Training in maritime and shipboard firefighting for firefighters and those working in the industry is essential and provides delegates with the knowledge and skills to confidently deal with fires on board a ship. The training increases safety and reduces the potentially catastrophic results of fire.

On 6th May 2006 the engine room on board the 'Calypso' cruise ship caught fire while travelling from Tilbury in the UK to St. Peter Port in Guernsey; the ship held 708 people including passengers and crew. Thankfully no lives were lost and the fire was extinguished due to the prompt action taken by the watch-keeping engineer officer. The vessel however was left with only emergency electrical power, it suffered severe damage to the starboard main engine and was left drifting until eventually being towed to the port of Southampton. The Marine Accident Investigation Branch (MAIB) established that: *"The fire was intense and the subsequent firefighting response highlighted flaws in the knowledge, experience*

and training of some of the senior ship's officers." The report continued: *"Those in charge of the fire-fighting response did not appear to follow good practice"*. It went on to say: *"On a number of separate occasions soon after they thought the carbon dioxide had been released, senior officers re-entered the engine room without the proper equipment or back-up and with subsequent risk of allowing air to feed the fire"*. It is evident from this case and other similar incidents, the importance of undertaking ship firefighting training to protect those on board and to arm the crew with the correct skills and knowledge to fight a fire at sea.

The Training Academy at Devon & Somerset Fire & Rescue Service has a dedicated Maritime School based in Plymouth, Devon, UK. The school offers the full suite of STCW 95 Personal Safety and Social Responsibility (PSSR) courses. Other training programmes include Boatmasters and Fisherman and Fire Fighting in Boat Marinas. Tim Mockridge is an expert in the ship fire fighting industry and jointly heads up the Maritime School, he said: *"In January*

MARITIME AND SHIPBOARD FIREFIGHTING



2012 the International Maritime Organisation (IMO) introduced a mandatory course refresher time of five years for all STCW 95 courses." All delegates who have successfully completed a course within the last five years will be required to take a refresher course five years after their initial course completion date. Tim added: "We are urging employers to spread out course dates for their staff throughout the final year to avoid their refresher date lapsing, as places are likely to fill up rapidly".

The Maritime School has recently added the BTEC Level 3 Advanced Award in Maritime Fire Fighting for Firefighters and Junior Officers and BTEC Level 4 Professional Award in Maritime Fire Fighting Incident Command for Flexi and Senior Officers to the range of courses. The course content includes:

- Fire alarm and detection systems.
- Fire fighting equipment and tactics.
- The impact of fire fighting techniques and stability during marine incidents.
- Fire fighting in ports, at sea and inland waterways.
- Action on arrival and operational considerations.
- Effects of heat and humidity and the removal and cooling of hot gases.
- Hose management and use of fire fighting media.

The Maritime School has recently designed courses specifically for the hyperbaric industry including Initial Fire Fighting in Hyperbaric Environments and Breathing Apparatus for Offshore Diving Rigs and Chambers. Fires that occur in the confined space of a hyperbaric chamber can cause disastrous results, so the importance of understanding how to tackle fires in this unique environment is vital. Tim said: "We introduced these courses as there is a growing necessity in the hyperbaric industry for fire prevention. When there is a fire in a hyperbaric environment it is so oxygen rich that anyone present in the chamber will almost certainly lose their life".

The course also includes the use of breathing apparatus due to air contamination in these circumstances. There are a large number of hyperbaric chambers that operate around the UK and most of the

lives that have been lost in hyperbaric confined spaces over the world are due to fires. Ken Mulville who also heads up the school said: "The Maritime School would like to stress that hyperbaric chambers are unique and potentially dangerous environments and we need to educate people on how to avoid the risk of fire".

The Maritime School is continuously assessing the industry and responding to training needs. Recently Tim and Ken have identified a world-wide need for training in the anti-piracy/vessel security sector. The crime of piracy is considered a breach of 'jus cogens', a conventional peremptory international norm that states must uphold. Those committing thefts on the high seas, inhibiting trade, and endangering maritime communication are considered by sovereign states to be 'hostis humani' generis (enemies of humanity). Seaborne piracy against transport vessels remains a significant issue (with estimated worldwide losses of U.S. \$13 to \$16 billion a year).

Piracy is particularly common in the waters between the Red Sea and Indian Ocean, off the Somali coast, as well as in the Strait of Malacca and Singapore, which are used by over 50,000 commercial ships each year. A recent surge in piracy off the Somali coast spurred a multinational effort led by the United States to patrol the waters near the Horn of Africa.

Modern pirates can be successful because a large amount of international commerce is transported via shipping. Major shipping routes take cargo ships through narrow bodies of water (such as the Gulf of Aden and the Strait of Malacca) making them vulnerable to be overtaken and boarded by small motorboats. Other active areas include the South China Sea and the Niger Delta.

As usage increases, many of these ships have to lower cruising speeds to allow for navigation and traffic control, making them prime targets for piracy. While the non-wartime 20th century tradition has been for merchant vessels not to be armed, the U.S. and recently the UK Government has adapted the rules so that it is now 'best practice' for vessels to hold a team of armed private security guards. In addition, the crew themselves can be given weapons training.

These security staff, mostly recruited from the world's armed forces are regularly carried on board, however the IMO and Maritime and Coastguard Agency (MCA) regulations class them as members of the crew. As staff members they are required to undergo basic role and safety training



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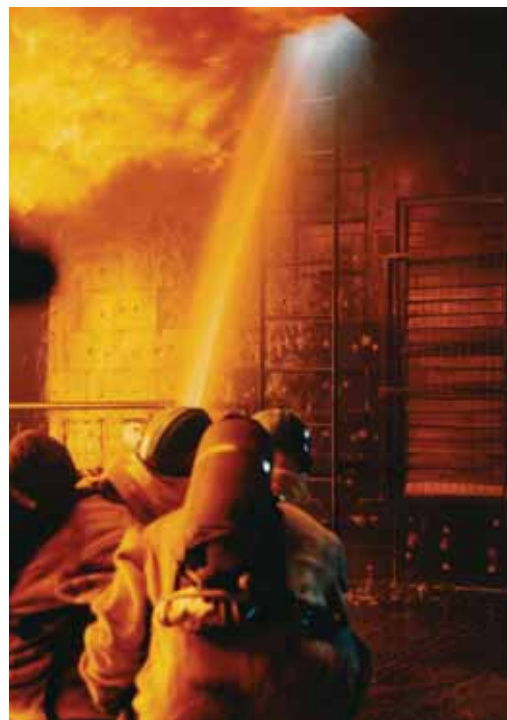
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such as Ships Security Officer (SSO) and STCW 95 Personal Safety and Social Responsibility, Fire Fighting, Personal Sea Survival and First Aid all of which are offered at the Maritime School. In addition, bespoke courses can be designed to accommodate differing needs within the maritime security industry if required.

The school has recognised the expanding need for firefighting training for security personnel in docks and yacht marinas and staff are urged to undertake training. As these vessels sit within such close proximity of each other there is the potential that a fire will spread rapidly to neighbouring yachts, possibly causing a loss running into millions. It is stressed that no formal qualifications are required for these courses however; training is highly advised for those that work in marina security. As well as a one day Marina Fire Fighting course, which is aimed at people who have responsibility for the running and security of boat marinas, Ken and Tim have devised and implemented customised courses for those working on super yachts including VAVA 2, valued at around 160 million pounds.

After communicating with the crew and researching their specific needs the Maritime School conducted life-like training on the yacht as well as running training days at the Maritime School. Despite the crew already being STCW 95 qualified, the VAVA 2 staff members wanted to ensure that they had completed a day's refresher course before they went to sea on the multi-million pound yacht.

The Maritime School can offer tailored courses in all areas in order to give delegates unique training that is specific and relevant to their industry, elements can be added to STCW 95 courses for example, however the components that make the course accredited are required to stay in place. This is to ensure that students receive not only STCW 95 certification but they will also gain more in-depth training to enhance their firefighting knowledge, which is relevant within their sector. Tim said: "Delegates walk away with an accredited



certification as well as training that meets the specific needs within their industry, which further increases crew and passenger safety".

The content of the Fire and Safety at Sea Legislation Regulations of the STCW Codes are the main focus of the day to day work activities carried out at the Maritime School. The school has been in existence for over thirty years and the STCW 95 curriculum has recently been re-accredited by the UK MCA after changes had been made to the course contents. Tim said: "The STCW 95 certificates we issue are on behalf of the MCA and they have a rigorous system in inspection and accreditation for all the elements that we teach. It is this accreditation system that the school has just successfully completed, to enable us to continue certification."

While still adhering to the STCW 95 regulations the School has introduced new firefighting, ventilation and command and control techniques employed by international fire and rescue services. These procedures include basic fire behaviour skills such as the recognition of potential flashover and backdraft situations and the ability to control the environment with advanced branch techniques and basic tactical ventilation.

The school's facilities, in addition to lecture rooms and breathing apparatus training amenities include a demonstration room to enable students to witness the live actuation of sprinklers, inert gas flooding, foam systems and high pressure fog extinguishing systems. Devon & Somerset Fire & Rescue Service has recently completed the building of a bespoke specialist rescue tower based at its Service Headquarters in Exeter, Devon. The tower will allow students on Maritime courses to practice ship to ship access. The tower will also be a great asset to the Training Academy and will assist in the delivery of current and future working at height training programmes for the Academy's Access & Rescue School.

The ship firefighting structure based at the Maritime School is a steel, multi-compartment building that incorporates machinery spaces with fixed equipment and varied level gantries with multiple access points. Tim said: "The main success of the school comes from its ability to conduct carbonaceous burns rather than gas. This provides students with a greatly enhanced level of realism during fire fighting and the ability to control the conditions themselves using fire behaviour techniques and ventilation".

IFF

Jessica King is Training Academy Project Support Officer at Devon & Somerset Fire & Rescue Service

For further information, go to
www.dsfire.gov.uk/trainingacademy

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Graham Collins

Kitted Out

The technology behind the latest helmets, gloves and boots continues unabated, as manufacturers strive to develop the ultimate personal protection for fire and rescue professionals. Here we look at the latest products to come from the major manufacturers.

Today's Hero



With the advent of the HAIX Fire Flash, the Bavarian company introduced what it describes as “ground-breaking innovations to improve safety, protection and wearing comfort”, with the Haix climate system providing optimal moisture regulation in the shoe and the micro-soft-light system not only providing cold insulation but heat insulation as well. The foam rubber, highly wear-resistant and non-marking shell sole offers high dampening properties that are perfect for any terrain. The integrated Gore-Tex technology keeps the Haix Fire Flash watertight, breathable and keeps chemicals out.

The Fire Hero is the company's top model: a firefighter boot said by Haix to have “never seen before in such functional perfection”. The latest product in this series is the Fire Hero Vario, a slip-on version. Light, secure and comfortable, that although not equipped with complex fastening technology, the Haix ankle flex system enables the best possible fit for a slip-on boot.



Stretch inserts also make it easier to put the boot on. Integrated bending zones in the instep and above the heel ensure high flexibility during forward and backward movement, such as when in the kneeling position. The CrossTech membrane keeps both bacteria and viruses out while still remaining breathable.



The brand-new, sporty recreational product line Black Eagle from Haix combines running shoe technology with functionality. This sporty professional comes in two product lines. The Athletic is characterised by a light, microfiber design, while the Tactical series is designed using classic leather. Both are available in three different heights and with equipment options that professionals want in a shoe – both on the job and off.

For more information, go to www.haix.com

MED-approved Protection



The most recent products from Croatian helmet manufacturer, PAB AKRAPOVIC, is the PAB Fire 04 HT, the PAB Fire 03, the

PAB Compacta and the PAB Compact III FF, all of which are made of fireproof composite fibre reinforced materials and co-polymer plastics.

The new Fire 04 Composite is being heralded by the company as the fireman's helmet of the future, incorporating new technology and superior design, guaranteeing complete safety even in flashover flames. It provides protection against temperatures of up to 1000°C in a ten-second flashover flame, weighs just 1.35kg (including visor face shield and neck protector), and is available with a wide range of accessories. Neck protection is aluminium carbon-fibre, while Interior shock absorption is made of polyurethane foam.

The PAB Compacta helmet provides a high level of protection; it is light and comfortable and also comes with a number of accessories that allow the helmet to be personalised.



Both the PAB Fire 04 HT and the PAB Compacta are designed for marine fire-fighting in accordance with the latest EC Marine Equipment Directive (MED).

For more information, go to www.pab-buzet.com

Extra Protection

"Be on the safe side with blood and body fluids", that is the message from ESKA when promoting its SKA 100 Crosstech glove with X-TRAFIT product technology for technical rescue operations, when firefighters face countless threats. In these applications, protective gloves must contend with these threats and offer a high degree of tactility.

Making the right decision is not as simple as it might seem. At the moment there are no EU-wide standards requirements for protective gloves for technical rescue operations. Risk assessment is often influenced by specific incidents and driven by regional decision making even though, for example, the UK Fire & Rescue services assess that the risk from exposure to blood and body fluids is higher than from heat and flame.

The ESKA 100 Crosstech glove offers both durable protection and comfort. It is penetration resistant to blood and body fluids to ISO 16604:2004 (*Clothing for protection against contact with blood and body fluids — Determination of resistance of protective clothing materials to penetration by blood-borne pathogens — Test method using Phi-X 174 bacteriophage*). The glove is also resistant to penetration by defined liquid chemicals to ISO 13994:2005 (*Clothing for protection against liquid chemicals —*



Determination of the resistance of protective clothing materials to penetration by liquids under pressure) and NFPA 1951 (*Standard on Protective Ensembles for Technical Rescue Incidents*).

The glove is waterproof even after contamination or washing and breathable, meaning that moisture vapour can escape from the glove. Its construction incorporates an exceptionally thin and durable single-layer insert with soft, supple and barely noticeable sealed seams, while the Crosstech membrane insert is fully bonded to the inner lining and durably connected to the glove's outer shell. The glove inserts (membrane and seams) are tested according to ISO 1660, and the laminates and seams are resistant to the penetration by blood-borne pathogens.

This results in a glove with a high degree of tactility and a firm grip and flexibility; one that is easy to put on and take off. Tested and certified according to EN 388: 2003 (*Gloves Giving Protection from Mechanical Risks*), the ESKA 100 Crosstech achieved Level 5 for palm and back of hand cut protection; and Level 4 for thermal performance to EN 407: 2004 (*Gloves Giving Protection from Thermal Hazards*). The glove has also been tested and certified in accordance with EN 407: 2004 for resistance to contact heat and splashes of molten metal.

For more information, go to www.eska.at





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Standard Compliance

PACIFIC HELMETS will be both updating existing models and launching new models to the new edition of AS/NZS 4067: 2012 that is coming into effect later this year and will see increased minimum requirements for structural fire helmets in the South Pacific and East Asia.

The New Zealand company claims to be the only helmet maker that makes structural fire helmets certified to all three major international standards – AS/NZS, EN and NFPA – so asserts that these



changes present no difficulties for it to meet, saying that the helmets Pacific currently makes fall well inside the requirements of any standard and so welcomes the changes that bring increased safety to the wearers.

The latest model to be released that will be certified to AS/NZS 4067: 2012 is the F10 "Battler". This is a jet-style helmet that features Pacific's "one touch" automatic deploying eye protector. Also available in this model is the option of an ultra-high temperature resistant face shield. A version of this face shield will also be available for Pacific's popular F3D and F4C models.

For more information, go to www.pacifichelmets.com

Designed-in Helmet Flexibility

The latest in fire helmet design and technology from BULLARD is the Magma. Designed with input from firefighters from around the world, it offers the individual firefighter the flexibility to configure a helmet to his or her exact requirements. It is available in two lightweight – it weighs less than 1,400 grams – shell configurations, allowing firefighters the design flexibility to choose a half-shell or three-quarter shell helmet.

Magma's design flexibility does not translate into complexity. Bullard says that the helmet was designed with the fewest number of components of any helmet available today, featuring just 29 components that can be easily assembled in just a few minutes. The design meets the requirements of EN443:2008, providing firefighters with added confidence in the helmet's performance, protected firefighters from the heat, flames, sparks and fluids that are part of their daily firefighting activities.



Magma offers firefighters a high degree of wearing comfort. The padded head ring is anchored in the rear by the Bullard ratchet sizing mechanism that provides the wearer with the ability to make comfort adjustments at five different points. An X-shaped neck strap and a four-way adjustable chinstrap add further to the firefighter's ability to obtain a comfortable fit. The mask adapter design accommodates all of the leading brands of two-point respirator masks and is also spacious enough to accommodate spider-style mask harnesses.

Magma also features a three-dimensional visor that covers the retracted front frame for a maximum degree of visibility in all directions; it also accommodates a variety of communications and lighting accessories.

For more information, go to www.bullard.com

Safer Extrication

RINGERS GLOVES' new Extrication Hybrid Model 337 glove is being heralded as offering increased dexterity, improved grip and non-restrictive cuff. It uses what the company asserts are premium materials that are combined with the finest construction techniques to provide maximum hand safety.

The new glove incorporates Ringers' ResQLoc grip system; a dual-layer palm constructed with a Kevlar top layer and a Clarino leather bottom layer for superior grip, with sturdy Kevlar stitching throughout the



entire palm. For extra impact protection, TPR bumpers are sonically welded and stitched on the top of the outer shell of the fingers and knuckles; there is also a high-visibility dorsal area. Ringers' Supercuff technology provides non-binding, non-restrictive cuffs for quick entry and a full range of motion. This new glove is oil resistant, boasts a CE rating of 4343 and offers the bonus of being machine washable and air drying.

For more information, go to www.ringersgloves.com



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Support in the Wake of Disaster



Tad Agolia

First Response Team of America

While there are many organisations that provide food, water and shelter for survivors of disasters, there is not an organisation that provides specialised equipment and experienced staff for the immediate needs of the leaders and members of communities, free of charge, in the aftermath of a catastrophe. Since May of 2007, the First Response Team of America has assisted local fire departments in dozens of communities across the United States in the wake of catastrophe.

The First Response Team of America (FRTA) is a non-profit, team of response workers operating a fleet of highly specialised trucks, gear and equipment that provides immediate emergency aid, free of charge, to areas hit by disasters. Its goal is to arrive in the crucial moments following a catastrophe, and its mission is to reduce the time it takes for help to reach those in need – joining local first responders in saving lives and restoring hope. Too often, communities are left on their own to respond to a disaster because the resources necessary for rescue and recovery – equipment, tools and personnel – are damaged, inaccessible or unavailable.

FRTA studies weather patterns and communi-

cates regularly with top meteorologists from The Weather Channel to track movement of the worst storms to anticipate when and where the next disaster may strike. Our fleet is pre-positioned for immediate response along storm-prone regions, and deployed immediately to the affected community once alerted of a strike, providing a needed service and filling in the gap that often exists between a storm strike and humanitarian aid response. With the help of The Weather Channel, FRTA arrives at most any disaster within the first few critical hours.

Upon arrival to a community, FRTA first identifies the local leadership charged with the response efforts, generally local municipalities and fire



departments, and reaches out to them to offer its personnel and equipment. One of the realities of disasters is that the community's police, fire, emergency response and health care resources are damaged or even wiped out. Additionally, the unpredictability of when a disaster might occur prohibits the communities from spending the money for resources that are vital after the disaster.

Fire departments perform essential functions in the community, and particularly during the immediate stages of a disaster. But 86 percent of fire departments in the U.S. are made up of volunteers and only have the arsenal of tools and equipment for fires and car accidents. Even more, the resources and equipment of the fire departments are so often completely destroyed, leaving them without any tools to perform their jobs effectively and be first responders to their neighbours in need. Local municipalities, also crucial in a community's recovery, generally provide maintenance

support for snow and garbage removal, and road repair. When faced with a large-scale disaster such as a flood, hurricane, tornado or earthquake, these first responders do not have the resources to respond to those in need. The First Response Team delivers unique and specialised equipment in these initial hours, and augments the resources of local responders, expediting the response, saving more lives and jump-starting recovery.

Services Provided

FRTA opens critical roadways blocked by debris and power lines so fire trucks, ambulances and other agencies can move into the area with less risk; provides temporary power solutions using industrial generators and light towers to restart and mobilise critical service centres such as emergency rooms, nursing homes, shelters and critical first responder centres. FRTA also provides light towers and search and rescue gear to identify where victims are in the rubble.



Greensburg, Kansas Tornado and the Birth of the First Response Team

Before creating the First Response Team, I was the owner of a lucrative business conducting large-scale disaster recovery and clean-up, one or two months after a storm. But I often wondered what happened to these communities on "Day One" of a disaster. After seeing the devastation of New Orleans caused by Hurricane Katrina and similar travesties, I thought there must be a need for an emergency response organisation using heavy equipment in the aftermath of these disasters.

When a tornado is so powerful that it throws homes, tractor-trailers and commercial buildings through the air and drops them on roadways, who moves that debris? How do ambulances and fire trucks pass through the rubble to access people in need? If the whole town is destroyed, including all the equipment in the local municipality and fire department, what do they do to simply open up roads? What chaos, confusion and despair must



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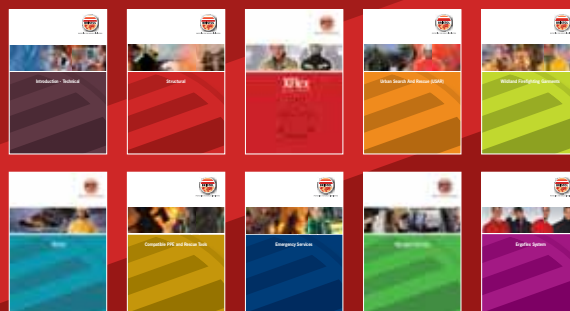
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there be? What is it like in the first few days and the first few hours? What happens in that first night when communities have lost everything? Could I help then? I decided to find out.

In May 2007, Greensburg, Kansas was struck by an EF-5 tornado. I decided to deploy my equipment to Greensburg, and see what was needed on that first day and that first night. When I arrived, I was introduced to a local police officer, and showed him my large Prentice crane truck equipped with a specialised hydraulic crane head. I explained that I could help open up roads. But nobody was being allowed in Greensburg at that time and every road was barricaded. But something kept me going, and I decided to continue into Greensburg until I hit the first roadblock.

I pulled up to a fireman who was standing in the middle of the road. After seeing my equipment and having a short dialogue with another gentleman on his radio, he instructed me to pull over to the side and wait until the man in charge could come out to meet me.

As I waited and the sun began to rise, I saw what I had never had the opportunity to see before – a community that had just experienced the wrath of Mother Nature. I was able to see in front of me what was left of this small country town. As far as I could see, everything was virtually levelled and whatever was still standing was beyond repair.

Moments later, I was introduced to the Public Works Director of Greensburg, and I explained that I was there to help and wanted to open up roads free of charge. Despite his hesitation that it was really for free, he explained he needed help clearing a path to the firehouse so that the firemen could access what was left of the firehouse. I agreed to do whatever he needed. We shook hands; he pointed toward the direction where the firehouse used to be and wished me luck.

I could not believe what I saw that morning. Fully loaded tractor-trailers were blown from across town blocking roads and huge steel I-beams were intertwined with building debris, blocking intersections. Just a few hours later, I cleared the debris leading to the bumper of the fire trucks. Concrete I-beams weighing thousands of kilograms had pinned both of the trucks down. The firehouse and trucks were destroyed and beyond repair. The fire chief was standing by as I made my last dig with the crane. The firemen were able to access their destroyed trucks and recover important tools and equipment they would need to help their devastated town. I also assisted with the clearing of roads, and the retrieval of vital records and documents from the bank.

I was so distracted at the tasks at hand that I did not have time to look around me and take it all in...until a woman walking through the rubble right in front of me collapsed. Two others who were walking nearby came to her aid. As I sat there atop my crane looking down at this woman, and then looking at the devastating destruction as far as I could see, I realised I was no longer going to use my equipment to come in two months after a disaster to make money. Instead, I was going to utilise all that I had built over the years in business to be there on Day One and through those first few critical days and weeks to help communities get back on their feet.

I began to take notes on other equipment that I would need to add to my fleet for the next time I responded to a disaster.

Team's Fleet

The FRTA team's fleet is led by four trucks, donated by Peterbilt and The Pete Store, as well as three RAM trucks provided by RAM Corporate, many of which are powered by Cummins diesel

engines. They house every tool and resource needed to respond to any type, size and scope of natural disaster, including a Caterpillar generator capable of powering a health care facility or other shelter, water pumps for clearing out essential buildings or low-lying areas of the community, a light tower for assisting search and rescue and for other operational or security tasks, and communications capabilities in the case of damage to local services.

For life saving, FRTA has hovercrafts, search cameras (infrared, rubble, underwater), and personal rescue apparatus including wet suits. When the need is to recover people from fallen buildings or other debris, also available are a plasma cutter, torches for metal cutting, a concrete saw, various wood cutting apparatus, provided by Stihl, welding equipment and compressed air. For debris removal, there is a custom-built truck, trailer and crane configuration specifically designed to move large volumes of debris. Obstructions on roadways blocking police, fire and emergency health vehicles can include entire houses, trees, vehicles and all manners of commercial and personal property. In addition, Caterpillar compact track loaders provide the versatility to provide access in a wide variety of locations.

Starting the recovery of the community utilises all of the same equipment mentioned. At some disasters, this equipment has been deployed before the disaster in an effort to prevent damage. Until the other response agencies are on-site and prepared to assume their responsibilities, tasks

such as enabling residents to return to their homes, opening thoroughfares, and even clearing parks for children to be able to play have the remarkable ability to affect the morale and reduce the feeling of helplessness of a community.

All of this equipment arrives as a unit, with 2,650 litres of diesel fuel, with an extensive inventory of parts, tools and equipment to be self-sufficient for several days with repairs and fuel.

Five Years Later

Since that first storm in Greensburg, Kansas, the First Response Team of America has responded to 52 large-scale disasters across the United States and Haiti. The organisation's goal is to be there for our neighbours in need, in the immediate wake of disasters, and jump-start recovery. We are committed to saving lives, assisting local fire departments and municipalities, and working hand in hand with our neighbours to pick up the pieces. But we cannot do it alone.

We need help to continue the work of the First Response Team, and help local fire departments and municipalities be heroes for their communities. We have the support of major companies like Peterbilt, The Pete Store, Caterpillar, Lowe's, Ram Trucks, and others to be there on Day One, but we need others to join their efforts so that the First Response Team can be there for our neighbours in need when disaster strikes, and help local first responders, the real heroes, help their community get back on their feet.

Tad Agoglia is Founder and CEO of First Response Team of America

For further information, go to www.firstresponseteam.org and www.weather.com/responders

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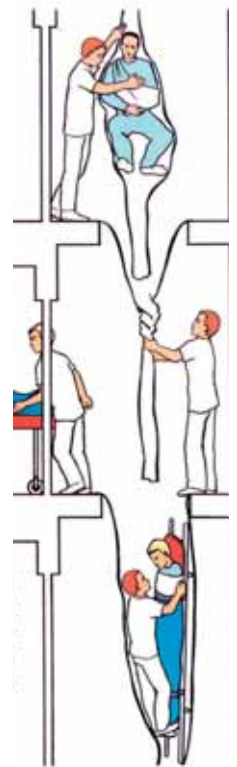
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UN USAR System B



Peter Crook

Hampshire Fire and
Rescue Service

A new course intended to further improve the standards of international Urban Search and Rescue (USAR) teams was held recently in the UK on behalf of the UN's International Search and Rescue Advisory Group (INSARAG).

Thirty senior members from some of the world's leading international USAR teams, plus several INSARAG officials attended the event held in Winchester in the UK. It was hosted by the UK Fire Service International Search and Rescue team (UK-ISAR) and organised jointly with INSARAG's Training Working Group.

The INSARAG External Classification (IEC) system is a unique process where teams voluntarily put themselves forward for assessment by USAR experts from other countries. If successful, they are formally recognised as an INSARAG classified team, either to a 'Medium' or 'Heavy' capacity.

This 'qualification' is fast becoming the international benchmark that USAR teams aspire to and reflects the aim of improving the coordination of disaster response. The era of uncontrolled mobilisation of multiple USAR teams of different sizes and capabilities – however well meaning – for an international disaster has caused various and sometimes serious problems.

The growing number of UN-classified USAR teams providing a full range of standardised capabilities and that are also trained to help with coordination appears to be changing this. Events such as the Christchurch earthquake in New Zealand show that controlling the number of teams and using classified teams with a known capability that will integrate properly into the coordinated response will significantly improve the outcome. There may also be a trend for disaster-prone countries to plan their requests for international help based on classified teams that will perform to a known standard.

These factors are almost certainly behind the rapid increase in requests from teams to be classified by the UN. There is currently a three-year waiting list. But classification is a major commitment that requires significant resources. Prospective teams have to prepare for an assessment that requires well over 100 different criteria to be fully met. The standards used are based on

oosted



the published INSARAG Guidelines, which aim to ensure teams meet the full spectrum of USAR operational capabilities, have an effective leadership structure, are fully self-sufficient, have a logistics element, a medical element, training systems, administration arrangements and mobilising protocols, plus plans and procedures for all eventualities. On top of this the teams also need to demonstrate they can fully integrate with the UN/INSARAG coordination methodologies that are implemented at major disasters.

A minimum of two years is needed from the time a team decides it wants to be classified to the final stage, which is a comprehensive assessment exercise. For the exercise, a classification team of at least eight international USAR experts from other previously classified teams is appointed by INSARAG and spend five or six days looking at every detail including closely monitoring a full scale 36-hour field exercise.

The IEC system has been evolving for the last seven years and has produced 30 classified teams worldwide. The system has been more successful

than ever imagined resulting in a very high demand from teams wanting to be classified. Previously-classified teams must also renew their classification every five years, so there are now well over ten events scheduled every year. It is a challenge for the INSARAG community to properly support so many classifications with the limited number of suitably experienced and knowledgeable experts currently available.

The success of the process depends on four crucial actors fulfilling the key functions, these are:

- The INSARAG Secretariat, which oversees and administers the overall process. This is a major workload and INSARAG is making great efforts to ensure it can achieve this.
- The USAR team itself, which must have governmental support, sufficient resources and adequate preparation time, fully engage with the process and realise the long term commitment involved.
- The team must engage a Mentor, whose job is to guide the team through the whole process and be a link into INSARAG.



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- There is a classification Team Leader who manages the whole technical assessment process, directs the other assessors and produces a final report.

The roles of the mentor and IEC team leader are vital and have traditionally been fulfilled by a tiny number of highly experienced USAR experts. The scale of the task now means a bigger pool of experts is needed. This makes it more important to ensure these experts are all applying the INSARAG Guidelines and the IEC process in the same way with the same interpretations and to the same high standards.

So it was decided that the best way forward was to design and run a specific training course to standardise the approach of the current experts and develop future IEC team leaders and mentors to the same level.

Because UK-ISAR has been closely involved in IECs it offered to help organise and host the pilot course. INSARAG specifically invited a mix of experienced and potential team leaders and mentors and the numbers were kept small to ensure the quality of the training was high. The venue proved to be ideal. Winchester is in the county of Hampshire, less than one hour from London's Heathrow Airport. The County's Fire and Rescue Service is part of UK-ISAR so provided local support. Hampshire is also home to Fort Widley, an excellent USAR exercise venue used for both of UK-ISAR's classification events in 2006 and 2009.

A practical day was also spent looking at exercise venues and assessment scenarios. The difference between a realistic USAR exercise scenario and a skills demonstration was emphasised using a basic training rig as compared to the very realistic Fort Widley site. UK-ISAR personnel also demonstrated good practices and some (deliberate) bad practices in different skill areas. Delegates were tasked with identifying the issues and recommending solutions both as a mentor and as a team leader. All this particularly helped the less experienced delegates and helped clarify further some of the grey areas.

It is a major financial and time commitment for INSARAG, the host country, the delegates and staff (who came from all over the world) to attend a week of training. So it was important to capture the value of this commitment. A thorough feedback process was undertaken by all participants and an extra day was spent by some of the staff to analyse this. The feedback was enormously positive with the only real criticism being that the course was a little rushed and too short. It was also recognised that due to the number of people needed at this level and the fact that some experienced mentors and team leaders could not attend this course, there was a need to run a similar course relatively soon.

The outcome has been that further work has now taken place to redesign the course with an additional day added and more time allocated to

The era of uncontrolled mobilisation of multiple USAR teams of different sizes and capabilities – however well meaning – for an international disaster has caused various and sometimes serious problems.

- The course itself included sessions on:
- The role of the INSARAG Secretariat.
 - The role of the Mentor.
 - The role of the IEC Team Leader.
 - The timeline of the classification process.
 - Compiling and analysing the written portfolio of evidence.
 - Clarification and interpretation of the IEC checklist.
 - Evaluating exercise plans.
 - Evaluating exercise sites.
 - Analysing the assessment programme.
 - Leading and organising the classification team.
 - Conflict management resolution.
 - Interactions between the main stakeholders.
 - Writing the report and presenting the results.
 - The re-classification process.

Most of the sessions were led by INSARAG officials or the individuals most experienced in the IEC process. As intended, there was a lot of interaction to ensure the vast experience in the group was shared as far as possible. By having all the core members of the INSARAG community involved in developing the IEC process present, it was possible to identify all the "grey areas" and then achieve a common understanding of the whole process. There were numerous excellent discussions throughout the week and as usual with these types of events a lot of learning took place in the evenings over dinner.

several of the sessions. INSARAG has also formally requested that the UK run another course, in the reviewed format, at the same venue and with the same organisation arrangements in the near future, preferably in early 2013. Planning for this is now in hand.

The IEC system is unique and has been a huge success story. There is no other worldwide process that has experts from other countries that fly in, carry out a detailed assessment of a national capability and then declare whether or not it is adequate. And this is voluntarily signed-up-to and accepted by countries as different as the USA, Japan, Spain, Iceland, China, Australia, Qatar, Russia, South Africa, Lithuania, New Zealand, Norway and many others.

Other humanitarian 'clusters' are now using the IEC process as a model for how they might set standards for their own response.

The INSARAG community is made up mainly of people who like to respond – quickly – to help others. But we also recognise the importance of structuring and coordinating the response and trying to ensure the teams that arrive to help are capable of making sense of the chaos and saving as many lives as possible. The outcomes of this new course will boost the effect of the IEC process by ensuring classified teams meet the INSARAG standards and can operate in the most effective way and therefore save more lives.

IFF

Peter Crook heads up the USAR team at Hampshire Fire & Rescue Service and is also the National Coordinator of UK-ISAR

For further information, go to www.hantsfire.gov.uk



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Structural Collapse – More common than you think?



Ian Dunbar

Holmatro

USAR teams have specific skills, equipment and training, so what happens when the structural collapse occurs on a more local scale, which does not immediately fall under the jurisdiction of specialised teams?

The term structural collapse is often associated with large scale urban search and rescue operations following natural occurrences such as earthquakes. Indeed the start of this century has seen many high profile natural disasters that have been well reported across the media, often showing this type of rescue operation being performed by specialist search and rescue (USAR) personnel.

Of course USAR teams are often a nationally funded resource and are specifically trained in this discipline and respond to any area of the world when required. They often take part in regular training sessions and large scale exercises, which allow them to maintain and develop their skills in structural collapse rescue and other areas of USAR operations.

As well as learning specific skills, they are also provided with specific tools and equipment, with-

out which, this type of rescue operation would be unsafe and extremely difficult. This equipment is often very different from the equipment used during 'normal' fire fighting and rescue operations.

So, if USAR teams have specific skills, equipment and training, the question is: what happens when the structural collapse occurs on a more local scale, which does not immediately fall under the jurisdiction of specialised teams?

Rescue Scenarios Involving Structural Collapse

We must understand that any firefighter/rescuer can attend an incident where structural collapse or instability will have to be managed. This will immediately compromise the safety of everyone on scene and inevitably delay rescue operations. It is also important to remember that structural collapse does not just refer to 'buildings', but

STRUCTURAL COLLAPSE RESCUE

A mobile concrete crusher quickly breaks up large pieces of concrete



relates to any kind of structure that may need controlling in the event where rescue is necessary.

In general, the first response to these types of incidents will not include specialist urban search and rescue teams. So, the skills and equipment required may not be immediately available on scene and the incident progression may be halted

Examples of incidents where structural collapse has to be managed include:

- Transport versus buildings (cars/trucks/ aircraft)
- Unsafe structures as a result of gas explosion
- Unsafe structure as a result of building/renovation
- Unsafe structure as a result of fire
- Trench collapse

due to having to adopt a defensive strategy.

It simply is not practical for every rescuer to be specially trained and equipped to deal with structural collapse incidents. However, if we accept that attendance at this type of incident is foreseeable, then our preparation must be such that an effective emergency response capability can be deployed in the first instance, allowing rescue operations to safely progress.

In my career I have witnessed many incidents that involved some form of structural collapse or where a structure needs stabilising, so a safe area can be established. By far, the most common was when vehicles collide with buildings. In many cases, there is a building that needs securing before extrication can take place. Of course there is an option to relocate the vehicle, but this is not sympathetic to the victims. Movement of the vehicle may certainly compound their injuries.

Gas explosions in domestic and commercial properties are not a rare occurrence and do not always result in a fire. The blast wave exposes the structure to a very rapid dynamic load as a gas explosion will generate high pressures and often also high flow velocities. It is the pressure and flow that cause the dynamic load on structures and consequently cause the damage. Upon arrival, without the ability to stabilise the structure, there is very little chance of performing effective search and rescue operations in the initial phase.



An emergency shoring system provides quick and reliable stabilisation



*Emergency shoring system for stabilisation and (hydraulic) lifting in every rescue situation
Picture courtesy of Erik Haverhals*

Building and renovation work affect the integrity of a structure, and collapse during this type of work is possible particularly where work involves load bearing elements of the structure.

A building that has suffered severe fire may show signs of collapse. The heat causes thermal expansion of steel beams (in older building these beams may not be protected) and causes brick walls to bulge outwards. All firefighters should be aware of these signs and symptoms of collapse and be able to identify these risks during firefighting operations.

Trench collapse operations require rapid intervention due to the nature of injuries that are often

Training and Awareness

Building construction is a vast subject and of course differs enormously around the world. However, local/regional building methods tend to stay relatively similar (with the exception of new materials, especially in commercial structures) and this gives a focus for learning. An understanding of how the load bearing elements within structures work, will give you an appreciation of the consequences when these parts of the building are damaged or completely destroyed. This will also make you understand what actions need to be taken in order to rapidly support this area in a dynamic situation.

USAR teams have specific skills, equipment and training, so what happens when the structural collapse occurs on a more local scale; one that does not immediately fall under the jurisdiction of specialised teams?

sustained. However the stability of the trench will be further compromised by the attendance of rescue personnel at the top, meaning that rapid stability is required.

None of these types of incidents are rare, and all require some form of structural stability to ensure a safer working environment and to enable the continuation of operations.

We have identified that it is not possible for every incident of this type to be attended by USAR specialists as part of the initial response, so what can be done to ensure the gap in knowledge and equipment can be reduced, giving the initial crews a safer working environment and greater options?

Appreciating the types and severity of injury encountered in such incidents will give you the understanding of the need for dynamic intervention and the control required during extrication. Structural collapse may involve some type of crush injury, and the importance of medical and technical intervention crews working closely together in such incidents cannot be underestimated. With crush injury syndrome, immediate release is not an option (depending on the time trapped) and the controlled release of a victim suffering this type of trauma is vital.

Identifying USAR teams who may cascade their knowledge is an option worth exploring. USAR specialists will – I am sure – be happy to attend

Transport versus building
Picture courtesy of
Cheshire Fire and Rescue
Service, UK



training sessions with firefighters/rescuers in order to assist with your learning.

USAR Equipment

USAR equipment differs from your normal firefighting and rescue inventory. However, there are some items that offer the possibility of crossover, and for the types of incident listed above, some of the equipment normally carried only by specialist USAR teams, should now be part of your primary rescue response.

• Emergency Shoring

This equipment gives you the ability to very quickly construct load-bearing shores that can create safe areas in which to work. They are lightweight, easy to construct and have both a load-bearing and lifting capability. They consist of a strut, extension pieces and, together with specifically designed heads and bases, can be used in a wide range of incidents to provide vertical and horizontal stabilisation. The struts can be hydraulic, pneumatic or manual and allow crews who are first on scene to start to stabilise the structure with a view to progressing the rescue. In the case of the hydraulic and pneumatically operated shores, these can be inserted and extended remotely, meaning that the rescuers are not immediately compromised in the risk area.

The main advantage of these types of systems is that they are not just suitable for structural collapse/trench rescue incidents, but can also be used for stability or lifting at road traffic collisions, either on single cars or large goods vehicles. So, the more exposure you have to using this equipment in more common incidents, like road traffic collisions, the more efficient you are using them at less common structural collapse incidents.

• Concrete Crushers

Removing the results of structural collapse in order to make progress into the building or rescue victims, the ability to crush concrete rather than cut means there is less noise and dust created. Less dust means the atmosphere is more tolerable

and the process of crushing produces little or no vibration at all, therefore not affecting stability.

• Power Wedge

This tool allows the rescuer to commence a lift with an insertion height as little as six millimetres. This lift can then be continued with a high pressure lifting bag and a full lift can be realised by use of a lifting cylinder or a shoring system with a lifting capability. This tool can also be used for breaching security shutters and opening elevator doors.

Conclusion

We must accept that as firefighters/rescuers, we can face a structural collapse incident any day of the week, and it is no longer just the type of incident faced by specialist USAR teams (when they respond to a natural disaster on a national or international scale).

There are many factors and events that make structures unsafe, and these are not uncommon and are indeed foreseeable. In most cases equipment and knowledge may mean that a safe intervention cannot be made immediately and this will inevitably put pressure on the crews on scene who will be facing the moral pressure to react. USAR equipment, historically used only by specialist teams, must now form a part of your initial response gear. This allows for a safe environment to be created in the first instance and then immediate progression can be made, before the arrival of further resources.

There will always be incidents that we respond to, where we do not immediately have the right equipment and specialised knowledge. However, the more these incidents occur, the more we must improve our capabilities in terms of what we have and what we know. Whatever we are faced with, crew safety is always the priority. Together with additional equipment and training, we can ensure that we operate in a safer environment, giving us the ability to more effective rescue on scene.

IFF

Ian Dunbar is a Rescue
Consultant at Holmatro
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Proposed ICAO Fire Test Changes Compromise Fire Safety



Mike Willson

Willson Consulting

A divergence in safety standards, particularly when it is from the same organisation, is uncommon. Rarely do we see proposals that push the boundaries and increase the difficulty of passing a new higher standard level, while at the same time seeming to “dumb down” the requirements for passing the current standard levels, by making them considerably easier to pass. How does this affect users of the standard trying to distinguish between products approved before and after these changes? Many are understandably concerned over the impacts of these changes on Airport Rescue and Firefighting (ARFF) safety.

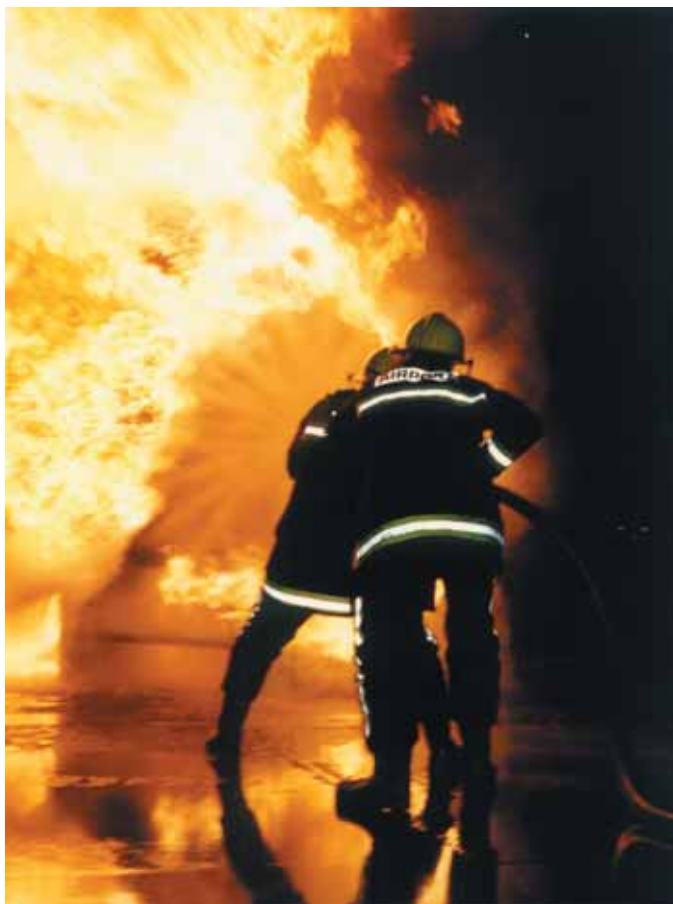
The generally accepted proposal of a safety standard is to increase stringency over time to provide better regulation and improved protection and safety, for those to whom it relates. New or upgrade standards usually arise once a solution has been achieved, proven and verified by extensive testing. It was therefore exciting to find the International Civil Aviation Organisation (ICAO) trying to reverse this process, raising the bar on firefighting foam standards, by seeking a higher performance level, ahead of the solution.

These proposals have challenged the fire industry to develop even higher performance products that

could help airports better address the combined problems of increasing passenger traffic, larger fuel loads and potentially more aggressive fires from using larger “super jumbo” jets like the Airbus A380. This aircraft can accommodate up to 800 passengers on a single flight, almost double the practical maximum for a Boeing 747-400 “Jumbo” jet. All survivors will need rapid evacuation to avoid being overcome by noxious smoke in a fire incident.

New Level C Test Proposed

The attraction of this proposed new Level C test is that it would permit substantially reduced quantities



of foam agent and water to be available on fire trucks to meet existing airport response requirements. This has substantial cost saving implications in terms of fewer trucks, lower staffing levels, and potentially cheaper vehicles as a standard chassis could be used due to the reduced payloads projected. Required performance criteria could potentially be achieved within a non-specialist, non-custom built truck category at substantially lower costs. These resulting economic incentives are significant for airport operators, particularly larger category airport hubs. They are expected to embrace this new Level C requirement once scheduled implementation occurs in November 2013, assuming member States ratify it after the discussion period, expected to start in July 2012.

Requirements for Level C

Key proposed performance changes hinge on a substantial lowering of the firefighting foam application rate on the Avtur Aviation Kerosene test fuel. The test rate is being reduced by 30 percent from 2.5L/min/m² at current Level B standard, to 1.75L/min/m² while using the existing UNI 86 aspirating test nozzle, so the foam quality requirements remain unchanged. The fuel and water base are increased by 57 percent to 157 litres each, and the circular fire tray area is also increased by 63 percent to 7.32m².

Key objectives of this proposed C level, mirror those for existing Level A and B fire tests. That is:

- To extinguish the test fire within 60 seconds.
 - Achieve less than 25 percent foam blanket burn-back from exposure to heat and fuel within 5 minutes from burn-back pot ignition.
- It is anticipated that this proposed Level C

anticipates a 25 percent reduction in practical application rates to around 3.5L/min/m² delivered by ARFF services, from the current 5L/min/m² of fire area commonly adopted by ARFF services in much of Europe, the Middle East and Asia. Achieving this Level C criterion requires at least a three-fold increase in fluorotelomer surfactant levels over existing Level B approved AFFF foams, according to Solberg's Luc Jacobs presentation at the UK's 2009 Reebok Foam Conference entitled "ICAO Level C Performance", which emphasises just how tough it is to pass.

Can Multiple Finishing Posts Ever Be Acceptable?

Any standard requires a clear pass/fail criterion to be of value. This provides a meaningful benchmark to those expected to use it and make decisions based on its repeatability.

This Level C fire test requires fire extinguishment (meaning no flames) within 60 seconds. However there is a worrying note suggesting that small flickers between the foam blanket and fire tray are permissible (meaning that the fire is not extinguished)! It suggests these flickers should not exceed 25

percent circumference of the tray and must be extinguished before foam application stops at 120 seconds.

How and why extinguishment should suddenly shift from 60 seconds to potentially 120 seconds and include existing Level A and Level B fire tests is not explained but, in future, it would allow substantially inferior foam products to pass, seriously diluting the current standard and causing major confusion for ARFF services. The presence of persistent flickers in a fire test is evidence of non-extinguishment and indicates a significant risk of re-ignition during an emergency. It effectively doubles the required extinguishment time, meaning that the quality of foam meeting this standard is potentially halved, defeating the primary objectives of this standard: to raise the bar; and clearly separate acceptable, from unacceptable.

The acceptance of flickers in the ICAO Level C fire test offsets the increased strength of the test from the larger fire and lower application rate, so what does it achieve? It jeopardizes the goal of Level C, to encourage the development of more effective and efficient foam agents, for use in aviation. We understand only two AFFF foams have so far met this 60 seconds extinction criteria at Level C, but it is not clear whether these products were allowed to pass the test with flickers, or not.

Perhaps this dilemma, triggered the idea of allowing flickers within these proposals? Alternatively, perhaps it indicates this test was designed hurriedly to allow potential cost savings by airport operators to be quickly realised, rather than identifying key parameters needed for safety improvements with clear pass/fail criteria, so everyone can benefit.



Fixed or Moving Foam Delivery

Another area of concern includes the fixed position nozzle. Although reducing human interference during testing, this potentially makes the test harder, but the results more comparable. It does not easily replicate practical firefighting where nozzle movement around the fire area is instinctive and ubiquitous. Maybe it helps build additional safety margin?

Extinction or No Extinction?

The Oxford English dictionary defines extinction as: *"no longer burning; out; quenched; has ceased activity; has died out"*. So how can persistent flickers after the defined 60 second extinguishment time possibly be acceptable? It is clear; the fire is either out, or still flaming. Any fire protection standard should recognise this as a fundamental distinguishing requirement.

A bigger concern is that allowing flickers at all levels substantially "dumbs-down" and weakens both well-established Level A and Level B fire tests.

Likely Impacts of Allowing These Flickers

Diluting the performance criteria by allowing flickers would allow previously unacceptable, less effective foam agents to meet ICAO standards and be used at airports worldwide. This has the potential to delay or prevent fire control and extinction in an emergency, unnecessarily increasing the risk to passengers, crew, and firefighters.

- **Unacceptable Quality Passes**

Numerous currently unacceptable quality ARFF and Fluorine Free Foam (F3) concentrates at airports worldwide, could suddenly qualify as "acceptable" if these proposals are accepted. This could not only delay or prevent fire control and extinction in an emergency, but also increase the risk of unnecessary injury or death to casualties, passengers, crew, firefighters and other rescue personnel, with no justification. Can this be right?

- **Additional Foam on Trucks**

Future foam purchasers may not realise these implications when they are suddenly offered

much cheaper "approved" but inferior quality products, that no longer meet their expectations based on current ICAO Level B approved products. Using less effective foams should require additional foam and water resources to be carried on fire trucks, offsetting this lower performance ability, producing the opposite effect of what ICAO set out to achieve. Why?

- **Return to Mil-F**

These changes may encourage a return to the US Mil-F spec. Currently only Mil-F spec. ARFFs are allowed to be used at all airports across the USA, which despite its many faults, at least gives clear pass/fail criteria.

- **Increased Risk of Injury**

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Safety Impacts of Fluctuating Water Pressures and Water Quality

Fluctuating water pressures can also erode the safety margin of the foam. As pressure drops, inferior foam quality may be produced. Utilising lower quality foams may cause failure to extinguish or sudden flare-ups that could endanger lives. Poor water quality makes these problems worse.

Practical Fire Fighting Usually Relies on Inferior Foam Quality

Foam quality from practical nozzles often falls short of UNI 86 test nozzle performance. There appears to be no allowance in these changes to

trates, allowing passengers and crew to exit an aircraft safely and have the best chance of survival, may with these changes continue burning and struggle to put the fire out. Such delays in extinction could significantly increase the chances of unnecessary injury or even death to casualties, passengers, crew, firefighters and other rescue personnel, without justification. Why? How worrying is this for all of us passengers?

- **More Lives at Risk**

There is a clear desire among several airport operators to be using Fluorine Free Foam (F3) but they are prone to sudden flashbacks and rapid re-involvement. So far only three F3 products claim an ICAO Level B certificate, although there are concerns in several circles about how this was achieved, since others cannot replicate these claimed results. With these changes allowing flickers up to 120 seconds, many other F3 and inferior quality ARFF products will suddenly be capable of gaining ICAO Level B certification, increasing the dangers of delayed extinction and sudden flare ups or flashovers, undoubtedly putting many more lives at risk.

High Ambient Temperatures Reduce Safety Margins

Of concern to firefighters is the margin of safety erosion forced by these changes, which have been traditionally maintained by these standards to protect firefighter and passenger lives. Many airports around the world permanently exceed the test ambient air temperature range of greater than, or equal to 15°C, which most will try to minimise. At higher temperatures foam bubble quality is usually reduced, fire extinguishing ability is frequently slower, and burn-back periods are regularly shortened, even with high quality products. Inferior products may not be capable of extinguishing fires at normal application rates under prevailing ambient conditions. Sudden flash-backs may occur quickly that could endanger the lives of firefighters and passengers alike. Human-induced global warming is likely to exacerbate these problems, as ambient temperatures continue rising.

this reduced foam quality, resulting from the actual jet/spray nozzles and vehicle monitor streams normally used by ARFF teams around the world. Any safety margin that was provided by the current ICAO level B fire test could soon be eroded by allowing these flickers, putting more lives unnecessarily at risk.

Some foam types, notably F3, are not designed for use with non-aspirating nozzles and produce no film forming capability, which is often relied upon by ARFF firefighters for personnel safety. The standard should be addressing this in some way, possibly by having an additional non-aspirating nozzle test requirement.

Product Repeatability and Reliability

Insufficient consideration seems to have been given to the reliability and consistency we should expect for aviation applications. These should improve over time and be re-enforced by international standards. Allowing lower quality products with greater performance variation, contradicts the purpose of this previously well respected standard.

In conclusion, all ARFF firefighters and operators, airlines and airport management organisations should be concerned about these adverse impacts. Diluting the performance criteria by allowing flickers could allow previously unacceptable, less effective foam agents to meet ICAO standards and be used at airports worldwide. This has the potential to delay or prevent fire control and extinction in an emergency, unnecessarily increasing the risk to passengers, crew, and firefighters, and increase, not reduce, the amount of foam agent required.

Everyone's safety is being compromised by ICAO's proposed changes allowing these flickers.

We urge all readers to inform their member State representatives about the dangers of these adverse impacts, and request them to seek the removal of this proposed change to allow flickers at Levels A, Level B and Level C. A clear 60 seconds extinction time needs defining for all levels. This should achieve what this standard seems to be aiming for and we all strive towards, an enduring improvement to global aviation firefighting safety standards.

IFF

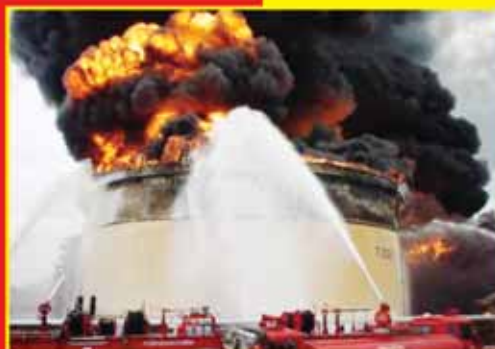
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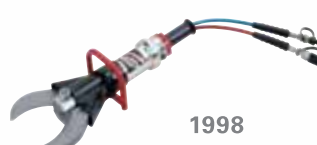
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Truck Accidents – a True Challenge . . .



Axel Topp

Nuerenberg Fire
Brigade

Just as a child is not a small adult from an emergency medical perspective, a truck is not just a big automobile. Accidents involving trucks have their own essential aspects that make them a special challenge.

Usually a truck is considerably heavier than a car. In a rear-end collision with another truck, much larger amounts of kinetic energy are involved, resulting in much higher deformation energy than for cars. Given this, it is no surprise that trucks are designed with reinforced front ends that pose serious problems for fire brigades. Here the required relief cuts call for cutters that not only deliver outstanding cutting power but also an effective cutting geometry with pull effect.

Besides the reinforced passenger safety cell, the patient is of course also at a much higher working position, making it more difficult for rescuers to gain access for initial contact and later extrication. Here the Lukas rescue platform makes a big difference.

Truck accidents (one truck rear-ending another) take up a lot of space. If such an accident happens on the motorway, it may be a good idea to keep space free for a crane when organising the work area at the accident scene. In special cases, a fire brigade crane can be a decisive aid for technical rescue when a vehicle needs to be lifted or towed. But as far as the use of rescue tools is concerned,

it can also result in long paths from the fire engines to the accident scene. Carrying rescue tools, hydraulic power units and assorted safety equipment takes time. This is exactly where rescue tools that do not need for heavy hydraulic power units come into their own. In addition, it is easier to work inside the vehicle with these “hoseless” tools.

With the aid of a mnemonic scheme that has proven effective in accident rescues for automobiles, the tasks in such an accident can be worked through methodically and nothing gets forgotten.

SIBORFA (from the German SEBTEFÜ) includes the following modules: **Secure**; Initial contact; **B**attery management, **O**pen door; **R**oof removal; **F**ree legs; **A**mbulance. These modules can be combined at the scene in accordance with the situation.

The following will highlight only peculiarities that distinguish truck accidents from car accidents.

● **Secure**

The Secure module includes a range of activities such as securing the accident area, assessing the overall situation, fire safety, securing and supporting the vehicle, glass management, removal of interior trim, and marking planned cuts. A

TRUCK ACCIDENT RESCUE



complete assessment of the situation is particularly important. After finding ways to gain access to the patient and looking for leaking fluids, checking the load is crucial. If hazardous materials are leaking, it can have fatal consequences for the rescuers.

The vehicle can be kept from rolling away by chocking the wheels or securing it with a winch. In this situation, winches should be used with special care; an 80kN winch will not be able to adequately secure a 40-ton truck on a slope. The passenger safety cell can be secured against unwanted movement with a truck securing set (tension belts and endless slings).

After securing the site, try to get a rescuer to the patient as quickly as possible so that vital parameters can be checked and decision about necessary speed of the rescue can be made. The quickest way that comes to mind to achieve this is of course a door that can still be opened. An alternative is the removal of the front windscreen as part of glass management. Sabre saws can provide

a decisive advantage here as a truck's windscreen is much larger than that of a car. Initial contact with the patient is much easier when the rescue platform has already been set up.

- **Battery Management**

In Battery management it is very important to ensure that the battery is not disconnected until the seat has been blocked in position. Disconnecting the battery, switching off the ignition or pressing the emergency stop button on a hazardous materials vehicle can lead to sudden lowering of the pneumatically adjustable driver's seat. This can reduce the pressure on trapped extremities, causing blood to accumulate in the legs. Lack of blood in circulation can result in shock. So if there is a pneumatic seat, never disconnect the battery or switch off the ignition if the seat has not been blocked in place.

- **Open Door**

When Opening the door for enhanced patient access, keep in mind that it can weigh as much as 80kg to 100kg. Before detaching the door in the hinge area, secure it from the other side of the vehicle with a rope.

- **Roof Removal**

Removing the roof of a vehicle that is lying on its side can be a very useful enhancement for rescue extrication; here sabre saws and angle grinders have proven effective.

- **Freeing Legs**

For Freeing the legs, use the two-cylinder method.

Insert the first cylinder parallel to the rocker panel at the level of the door lock after making a relief cut parallel to the rocker panel in the A-pillar. The cut in the A-pillar should be made along the markings,





downward towards the patient. The first rescue-ram pushes the front end forwards, releasing the trapped patient. The use of telescopic cylinders that have double strength in their first stage is especially effective for trucks. If this does not release the patient, relief cuts at the front of the vehicle to decouple it from the affected side of the vehicle are effective. Then position a second rescue-ram between the edge of the roof and the front edge of the dashboard or the A-pillar to stabilise the front end in the current position. The first rescue ram can now be removed to allow access to the patient.

• Ambulance

For transfer to the Ambulance, that is extrication of the patient from the vehicle, a scoop stretcher

or spine board can be used, or a KED in combination with a scoop stretcher or spine board. For extra support, the KED can be pulled on with a pulley on a turntable ladder. Then the patient slides onto the scoop stretcher more easily. To do this, space to set up the ladder must be kept available in the work area, which is not always so simple.

As described, there are certainly peculiarities to consider in truck rescues. Such operations, which are not exactly everyday activities, pose special challenges that fire brigades must be prepared to meet. To do that, an illustrated set of guidelines, such as the new poster about truck rescues produced by Lukas in association with the Nuremberg Fire Brigade in Germany, can help. **IFF**



Axel Topp is Chief Fire Inspector for Nueremberg Fire Brigade

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Graham Collins

Latest ARFF Vehicles

Airports across the world are continuing to invest in high-spec firefighting vehicles to safeguard passengers and crew alike. Among the latest manufacturers to make the headlines are Ziegler, E-One, Pierce and Oshkosh.

Singapore Landings

PIERCE MANUFACTURING has delivered and placed into service two custom-built apparatus at Singapore's Changi Airport, which is managed by Changi Airport Group. The vehicles include a Pierce mobile command centre and a Pierce 26-meter aerial platform.

The Pierce mobile command centre is an integral part of the airport's emergency response plan. It can be rapidly deployed to mitigate risks in the event of an incident. The vehicle features interoperable communications equipment and live video streaming to provide vitally important information to the airport's Crisis Management Centre. Emergency response teams can more readily and efficiently manage, organize, and monitor incidents for long periods of time from the command centre's conference area.

The Pierce aerial ladder platform is built on a custom chassis with a 26-meter aerial device. The platform's spacious basket, with a carrying capacity of 454kg, is engineered for strength and performance. Pierce aerial platforms feature Command Zone advanced electronics that deliver critical platform performance data in real time, giving the operator the information needed to work within the platform's safety parameters.

For more information, go to www.piercemfg.com



Record Breaker

The fire service in Frankfurt Airport has to cope with a wide variety of scenarios in order to protect hundreds of thousands of people every day on the 2,000 hectare site. In such a challenging firefighting environment speed is essential and for it to be possible to reach any point on the airfield within three minutes, the service has a new ZIEGLER FLF Z8 XXL vehicle.

Weighing in at 49 tons, the Ziegler airfield fire truck accelerates faster than most other vehicles: its two V8 diesel engines with a total



performance of 1,030 kW (1,400 hp) accelerate the FLF Z8 XXL to 80 kilometres-an-hour in just 21 seconds. It can achieve a maximum speed of 140 kilometres-an-hour on runways while complying with the current Euro 5 emission standard. The vehicle is fitted with two seven-speed fully-automatic gearboxes that not only ensure the fastest possible acceleration but also safe driving comfort.

Its equipment for fighting aircraft fires is also record-setting to ensure that fires should be extinguished in around 90 seconds to ensure that passengers and crew can be rescued in time. To achieve this, Ziegler has designed an efficient extinguishing system especially for its Z8 range. The pump drive is powered by a separate 360 kW (480 hp) motor with the result that the firefighting centrifugal pump achieves a rated output of 10,000 litres-a-minute at 10 bar. Extinguishing agents can therefore be applied at a full expulsion rate in less than 1.5 minutes from a 12,500-litre water tank. Depending on the particular scenario, an extinguishing articulated arm, a bumper turret or



additionally a body/ground protection system can be deployed. The latter is used for protecting the vehicle in the case of ground fires; for example a fire caused by leaking kerosene. The new Ziegler flagship vehicle also has an 800-litre foam tank and a powder extinguisher with a capacity of 500 kilogrammes.

Twelve meters long and three meters wide, the basis of the vehicle is formed by an 8x8 Titan chassis with single tires. The FLF Z8 XXL is also roadworthy and can therefore also be deployed for major emergencies off the airport site.

A total of six FLF Z8 XXL vehicles will be in service at Frankfurt Airport. The first vehicle was already delivered in time for the opening of the new North-West Runway in October 2011. These vehicles are replacing some obsolete airfield fire trucks, as well as expanding the existing fleet while supporting the 300 firefighters at Frankfurt Airport.

For more information, go to www.ziegler.de.

St Louis Regional Airport ARFF



The St. Louis Regional Airport has recently delivery of its first new ARFF vehicle, an E-ONE Titan Force 4x4.

The new Titan Force features large, unobstructed compartments, roof windows for a constant line of sight to the roof turret, E-One's integrated bottle storage and lift that make nitrogen bottles accessible from ground level, along with E-One's Rhino II bumper turret. This turret combines the dual flow rate of conventional primary turrets with a vertical positioning feature to offer advanced extinguishment and control of fire scenes while using 40 percent less agent.

For more information, go to www.e-one.com or www.Rhinoll.com

Changi ARFF

OSHKOSH AIRPORT PRODUCTS GROUP has delivered five new generation Oshkosh Striker aircraft rescue and fire fighting vehicles to Changi Airport in Singapore that has, over the past decade, been consistently ranked among the world's best airports.



The new-generation Striker features advanced safety systems and delivers innovative fire suppression technology, unmatched chassis performance and unsurpassed reliability and durability. The 6x6 axle configuration, with Oshkosh TAK-4 all wheel independent suspension and an Oshkosh rear steering system, offers a smooth ride and excellent off-road capabilities. The 700HP, Tier 4i/Euro 5 emissions compliant turbo charged engine is mated to a 7-speed electronic automatic transmission for smooth power delivery and a top speed greater than 113 kilometres-an-hour. The engine power pack components are readily accessed through walk-in doors on either side of the engine compartment for easier servicing.

One of the five Striker vehicles is configured with the Oshkosh Snuzzle high reach extendable turret for superior firepower. The Snuzzle, which is available in 15.2-metre and 19.8-metre lengths with single and dual nozzle configurations, is a multi-function tool that gives the operator the ability to more quickly place suppression agents at the fire source.

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LET'S WORK.

Protecting Firefighter's Respiratory Systems

Nowadays state of the art 21st century, modern day, lightweight ergonomically designed breathing apparatus with integrated telemetry systems are commonplace. However the question remains, is enough being done to protect the respiratory systems of fire fighters at today's fires?

Thomas Keane

Dublin Fire Brigade and
Athlone Institute of
Technology

Dr Carmel Kealey

Athlone Institute of
Technology

Dr Damien Brady

Athlone Institute of
Technology

Modern day firefighting is considered a science. Technologically we have come a long way since firefighters with heavy brass helmets and axes were required to grow facial hair. Their beards dampened and tied across their mouths with cloth acted as an improvised air filter when entering a burning building, the original Smoke Eaters. Progressing on from there were the very limiting smoke hoods and air pumps.

Today though, while fire brigades internationally are providing better PPE to firefighters, in particular breathing apparatus for respiratory protection, firefighters are still being exposed to lethal environmental toxicants from fire smoke. Why is this happening when modern day training methods and education far exceed training regimes of latter day brigades?

Firefighters understand that modern day fire smoke can be far more dangerous to individuals and that present day fire load contains copious amounts of toxic gas when compared to that of 30 years ago. Modern day materials, for example polyesters, can produce carbon monoxide, carbon dioxide, methane, ethane, butane, hydrogen and benzene. Another possible toxicant is polyvinyl-

chloride (PVC), which is used in plastics for electrical installations, telephone and computer cables, children's toys and normal household goods.

Practically every type of structure today contains products capable of producing toxic gases and although extremely high temperatures of 600°C and above can be reached in modern compartment fires, PVC can decompose at temperatures as low as 150°C. Smoke concentrations at these temperatures can be extremely low; consequently there are minimal warning signs for firefighters of the amount of toxic gases being released during these stages of a fire, which can lead to a false sense of security and a more relaxed approach to dealing with the fire.

Legislation & Standards

Globally there are a number of standards or legislative acts that impose an obligation on fire brigade junior and senior management. This extends to ensuring their own safety, that of their colleagues and the general public. In Ireland, for example, the Safety Health and Welfare at Work Act 2005 is the primary legislation used to protect employees, and is broken down into a number of different sections and regulations as displayed in the table below.

Table 1. Safety Health and Welfare at work Act 2005

Section		Regulation	
No.	Description	No.	Description
8	Prevention of risk to health at work	63	Assessment of PPE
10	Provide instruction and training	64	Conditions of use
19	Identify hazards and risk assessment	65	Personal use
20	Produce safety statement	66	Maintenance and replacement
22	Health surveillance	131	Health surveillance records and effects
80	Directors liability		

BREATHING APPARATUS

Table 2. Classification of toxic gases in fire

Narcotic Toxic Gases	Acute Effects	Chronic Effects
Carbon Monoxide	Decrease oxygen levels Unconsciousness Increased risk of heart problems Asphyxiation	Reproduction problems Cardiovascular problems Central nervous problems
Carbon Dioxide	Asphyxiation/Frostbite Headaches Dizziness	Kidney damage or coma
Hydrogen cyanide	Death can occur within minutes or seconds of the Inhalation of high concentrations of cyanide. Low blood pressure (hypotension).	Chemically-induced hypoxia may involve changes in the cell microtubules and neurofibrils The heart is also particularly susceptible to chronic hypoxia due to the changes in acid-base balance and electrolytes which result from anoxia in cells
Irritant Toxic Gases	Acute Effects	Chronic Effects
Sulphur Dioxide	Very water-soluble; it readily dissolves in the mucus of the upper respiratory system bronchial constriction resulting in a measurable increase in flow resistance; this is due to changes in smooth muscle tone since SO ₂ acts upon the sympathetic nervous system	Wheezing, mild dyspnoea, persistent cough and phlegm bronchial hyper-responsiveness; chronic respiratory disease and chronic obstructive pulmonary disease (COPD) symptoms
Acroliein	Acute exposure results in eye, skin, respiratory tract irritation Pulmonary edema	Chronic exposure results in cancer of the bladder and urothelial
Ammonia	Acute oral exposure results in pain, salivation and burns in cavity, nasopharynx, larynx and trachea, airway obstruction, respiratory distress and bronchiolar and alveolar Oedema	Chronic inhalation has been associated with increased cough, phlegm, wheeze and asthma
Hydrogen Fluoride	Irritation and pulmonary edema. Irritation of the eyes, nose, lacrimation, sore throat, cough, chest tightness, and wheezing. Severe ocular irritation and dermal burns may occur following eye or skin exposure fluorides	Chronic inhalation exposure of fluoride has resulted in irritation and congestion of the nose, throat, and bronchi. Increased bone density, renal injury, thyroid injury, anaemia
Nitrogen Dioxide	Nitrogen dioxide can cause death, collapse, rapid burning and swelling of tissues in the throat and upper respiratory tract, difficult breathing, throat spasms, and fluid build-up in the lungs. It can interfere with the blood's ability to carry oxygen through the body, causing headache, fatigue, dizziness, and a blue colour to the skin and lips	Genetic mutations, damage a developing foetus, and decrease fertility in women. Repeated exposure to high levels of nitrogen dioxide may lead to permanent lung damage. Unconsciousness, vomiting, mental confusion, and damage to the teeth, coughing, shortness of breath, fatigue, and nausea

Firefighter Exposure

Firefighters, due to the nature of the work they undertake, are frequently exposed to environmental toxic gases from fire smoke, including fumes, and as a result can succumb to both acute and chronic respiratory illness. Reports of the damage that toxic gases can cause to firefighters' health range from acute mild irritation of the eyes and upper airway tract and mucus membranes to chronic debilitating lung damage. Toxic gases in smoke can be differentiated into those

that induce narcotic effects and those that act as irritants.

The Problem

When we consider that the PPE supplied to firefighters reaches all the relevant International and EN standards, the question remains, why are these toxic gases causing medical issues and posing such a significant health hazard?

To investigate this, the first logical step is to examine the procedures, operational guidelines,

techniques, training and traditional customs used by 21st century firefighters to fight modern day fires.

Operational procedure in Ireland state that firefighters wear full breathing apparatus (BA) only on the command of their officer. This is after a dynamic risk assessment (DRA) specific to the incident has been completed. Some form of BA control is exerted by brigades no matter where in the world they operate. BA training is conducted to a very high standard in most fire brigades, not only are firefighters expected to undergo basic BA training but this is augmented by compartment firefighting training, on station BA drills and exercises and refresher training.

Due to the demographics and resources available in today's depressed economic society, when firefighters arrive it is normally to a fully involved fire. At this stage in the life cycle of the fire the amount of toxic gases given off by the fire are not as prolific. This can be attributed to the fact that complete combustion at a fully involved fire with unlimited amounts of oxygen leads to the majority of the toxic gases being burnt off.

Culture

Training styles, systems of work, structures, and staff generally make up the culture of the organisation. In general, fire brigades depend on operational staff to implement their safety programmes on the fire ground. Unfortunately most fire brigades seem to have acquired a macho persona and health and safety can be seen as being weak, timid and ineffectual. This can manifest in operational areas like not wearing respiratory protection at small fires, vehicle fires or fires in the open regardless of the amount of toxins or smoke being produced.

Although fire brigades operate a safe person concept, there remains the misconception among operational firefighters that the need for respiratory protection is minimal at these types of fires. This is not a taught behaviour, as firefighters are trained to read smoke in basic training, to understand the chemical reaction taking place and to protect themselves; therefore this must be a learned behaviour through the observation of custom and practice at operational fires.

The Reasons

Along with the learned behaviour of firefighters, the physical effort of wearing breathing apparatus in very arduous conditions, even with the new light weight sets available, is one of the reasons stated by firefighters for not donning their sets as soon as possible, and doffing their sets as soon as they exit the fire. Some of the disadvantages of wearing breathing apparatus are the equipment weight and size. This adds extra stress to the firefighter already under stress imposed by the fire conditions, and coupled with the exertion of climbing ladders, effecting entries, firefighting and rescuing victims is exhausting.

Firefighters are human with human fallibilities and can sometimes misread the circumstances and the need to wear breathing apparatus, and this normally correlates with their visual impression of smoke intensity at a fire.

Most fire brigades' breathing apparatus sets have facilities for the face mask to be removed from the back pack and regulator, allowing for an

adaptor filter cartilage [APR] to be fitted that enables the face mask to be used as a respirator, although not all brigades utilise these facilities. Unfortunately some respirators can alter the breathing pattern of the user and therefore can increase the physiological stress firefighters operate under, and again the extra physical effort of breathing through a respirator after firefighting in extremely high temperatures is a reason given for failing to use respirator cartilages provided. Additional health-based studies on the use of APR's during the initial and damping down stages of a fire should be conducted to confirm their effectiveness. It would be desirable to correlate this information on exposure with health outcomes and the morbidity and mortality experience of firefighters.

Conclusions

It is clear that firefighters are at risk of developing both acute and chronic respiratory symptoms as well as obstructive airway conditions that can have life changing effects on firefighting personnel and their families. And while fire brigades, both Irish and international, supply PPE to highest applicable standards, train their firefighters to the highest level of competence, and attain their obligations under their relevant legislation, it does not seem to have remedied the situation. Unfortunately to address the inconsistencies in firefighter behaviour on the fire ground and so limit the effects on firefighters from environmental toxins released in fire smoke and improve the protection afforded firefighter respiratory systems, management could consider the adaptation of a number of strategies.

Recommendations

- Fire brigades could consider the introduction of an appropriate safety officer at fire ground incidents with responsibility for the proper supervision and accountability for safe systems of work, as part of the overall incident command system thus relieving the incident commander of the need to micro-manage the safety of firefighters on the fire ground, and leaving commanders with one line of communications for the reporting of Health and Safety matters.
- An increase in the pre-determined attendance of fire appliances to provide extra firefighter numbers on the fire ground at the initial attendance would allow incident commanders the opportunity to rotate firefighting personnel and limit exposure.
- The Introduction of a comprehensive health surveillance programme for firefighters spanning their entire career, and a physical training schedule for firefighters that is age appropriate.
- A change in firefighter operational perception and behaviour is required. This should be done using pre-existing forums such as health and safety committees, safety representatives, trade unions and fire brigade management.

While the implementation of these strategies would go a long way to addressing the problem of protecting firefighters' respiratory systems and long term health, it also allows brigade management to comply with their legal obligations under the various applicable acts. We propose that adopting these strategies will not just reduce morbidity and mortality within the brigade but create long term financial savings for management.

Thomas Keane is a Sub-Officer with Dublin Fire Brigade's Health & Safety Unit and an MSc student in Environmental Health and Safety Management at Athlone Institute of Technology. **Dr Carmel Kealey** and **Dr Damien Brady** are with the Bioscience Research Institute at the Athlone Institute of Technology, Ireland

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A Hughes MD4 inflatable decontamination shelter in use



Decontamination – Making the Right Choices



Andy Whitehead

Hughes Decon Systems

Decontamination shelters have evolved to keep pace with potential threats and to extend the range of applications. It is important to make the right choice of ancillary equipment as well as the shelter itself to ensure optimum performance and maximum flexibility.

Responding to a Chemical, Biological Radiological, or Nuclear (CBRN) incident invariably means providing some form of decontamination.

As the potential threats increase and the hazards faced by the emergency services grow ever more complex, manufacturers of decontamination equipment have responded with a choice of solutions and specialist equipment optimised to suit specific applications. Saving life is always the priority and therefore a prompt response is essential. Decontamination involves washing potentially harmful substances from the body, and for emergency service personnel this may also include protective clothing and equipment. In principle, the process is straightforward and involves the use of a shower, either fixed or hand-held.

Developments in Detergents & Chemicals

Adding detergents and other chemicals to the showering water may help to speed up the removal of specific contaminants or simply improve the overall effectiveness of showering.

With traditional detergents and chemicals used for decontamination the emphasis has been on high dilution combined with soap/detergent solutions that in some cases can be a problem with insoluble contaminations. To address this problem with more practical knowledge and collaboration with chemical specialists and the introduction of new protocols, manufacturers can offer a more targeted approach. This can reduce run off waste by 90% and reduce time by 50%.

Development of Decon Structures

Speed of deployment is obviously critical in emergencies, so weight, portability and ease of erection are important considerations. Stability is also essential together with a high level of reliability. Shelters need to be able to withstand repeated use in harsh conditions, during training and actual deployment, without sustaining damage that would take them out of service for repair.

Early shelters focused on the needs of the emergency services, providing a portable showering system that could be quickly erected at an


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incident and used to remove contaminants from protective clothing and equipment.

As the threat from terrorism intensified, attention focused on mass decontamination and the possibility of having to treat hundreds or even thousands of casualties in the shortest possible time. In many instances, at least initially, this was achieved by simply scaling up the emergency units.

Manufacturers then addressed the specific needs of decontaminating large numbers of the public. Multiple channels through the shelter mean that male and female casualties can be treated simultaneously, passing along parallel channels separated by modesty screens. The internal partitioning in any shelter should be easily repositioned to ensure maximum flexibility – for example, providing separate channels for walking and stretcher-borne casualties. Different authorities have their own preferences based on local conditions, cultural needs and the nature of perceived threats, so this level of flexibility is essential for any type of shelter. Increasing the size of the shelter also provides additional space to accommodate two- and three-stage decontamination where the addition of chemicals and detergents to the initial wash water can improve its effectiveness.

As the threat from terrorism intensified, attention focused on mass decontamination and the possibility of having to treat hundreds or even thousands of casualties in the shortest possible time. In many instances, at least initially, this was achieved by simply scaling up the emergency units.

Decontamination shelters are either inflatable or have rigid frames. For both, the emphasis is on stability, durability and speed of deployment. The end use remains the same; it is the materials and construction that make the difference.

Inflatable Shelters

Shelters, such as the Hughes' Cupola range, consist of an inflatable frame with removable lining forming a stable and durable structure that is easy to erect. For safety an inflatable frame shelter should incorporate several separate sections so that, if it is accidentally punctured, the structure will not collapse on casualties or emergency service personnel. It is the same principle that applies to the design of life rafts and inflatable boats. Extensive testing has also revealed that contrary to what might be expected, glued and taped joints are far more durable and easier to repair than welded joints.

The ability to anchor the unit securely is also an important consideration as it may have to be used in adverse weather conditions. Although stability is

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DECONTAMINATION

A mobile infection control unit incorporating chemical additives in the shower water



the result of good design it also depends on the provision of secure anchoring points around the shelter so that it can continue in use during strong winds. The simplest and most effective is often strategically positioned guy ropes attached to the inflatable frame and secured by stakes driven into the ground.

Effective containment of contaminated wash-off is also important. While requirements relating to discharge into sewers will vary depending on local regulations, good practice dictates that all shelters should provide some form of sump to store the waste water until it can be collected and safely disposed of. With inflatable shelters this can be

A typical rigid frame emergency response shelter



supplied as an integral part of the base of the unit so that when the shelter is inflated it is already in place. Raised flooring is necessary, allowing water to drain through into the sump and prevent casualties standing in potentially contaminated wash off. This is invariably made from interlocking non-slip modular panels, in part for ease of storage and transportation but also to accommodate different shelter sizes and configurations.

shelters are becoming the preferred choice.

Firstly, lighter and stronger materials are used. In the shelter, the T6 aluminium frame is derived from materials used for mountain bikes, giving exceptional strength for its weight and good shock resistance. Neoprene-coated Nylon for the shelter covering draws its superior properties from many years research into lightweight water-proof clothing. The result is a lightweight shelter that is

Effective containment of contaminated wash-off is also important.

While requirements relating to discharge into sewers will vary depending on local regulations, good practice dictates that all shelters should provide some form of sump to store the waste water until it can be collected and safely disposed of.

Ideally, all shelters, inflatable or rigid framed, should be positioned on level ground. In practice, however, this is not always possible, and working on a slight incline can soon raise the level of water at one side of the shelter above the top of the floor panel. When approaching suppliers, it is therefore advisable to seek out the deepest possible floor panels to take account of any variations in water depth in the sump.

Rigid Frame Shelters

Although this type of shelter in various forms has been in use for a while, concerns have been expressed about portability, ease of erection and long term durability. Versatility is also increasingly important as emergency services try to maximise their investment in shelters to accommodate the growing range of applications. It is not economically viable or logistically desirable to carry a multitude of bespoke shelters.

The latest generation of rigid frame shelters, such as the Hughes' Articulating Rapid Deployment (HARD) Shelter, successfully addresses these issues. Now, with no need to compromise, rigid

easier to transport and assemble, robust enough to withstand rough treatment, even in the most testing conditions, requires minimum maintenance and lasts longer.

Ease of assembly is critical. The Hughes solution, for example, employs a single articulated frame that two people can erect and have ready to use in just two minutes.

If a rigid frame system as well as inflatable has an interchangeable liner this immediately extends the range of applications. With one standard shelter and a selection of liners, users can easily switch applications from decontamination shower to forensic examination tent, command and control facility or even a field mortuary. Insulation can increase the versatility even further, ensuring the shelter is equally effective in extreme climates. Depending on the application, air conditioning is also an option worth considering particularly for hot climates and when the unit is used as a temporary mortuary.

Whether opting for an inflatable or rigid frame system, it is important to choose a range of ancillary equipment that will optimise performance,

DECONTAMINATION

A mobile air conditioning unit can enhance and extend the performance of shelters



extend the range of applications and provide a measure of self-sufficiency that may be critical when working in remote places.

Ancillary Equipment

Understandably, the generator is often the first piece of ancillary equipment that operators consider.

Ideally, all electrically-powered equipment should have a 'low energy' rating. Reducing the power

especially by air. A further development is the availability of flexible solar panels that can be fitted to shelters when they are used over longer periods, such as in search and rescue operations.

However, such reductions must not be at the expense of endurance and reliability, which is particularly important in remote locations. The size of the fuel tank on the generator can be significant and best practise suggests an ideal capacity

Externally, low energy flood lights are the ideal choice and these can usually be supplied on telescopic columns to provide sufficient height for directing the light to flood the working area.

consumption of ancillary equipment such as lights and pumps has led to the use of smaller generators ranging from 2kW to 6kW depending on the load. In addition to energy savings, generators can be smaller and lighter making them more manoeuvrable, quicker to deploy and easier to transport,

to give at least eight hours of uninterrupted power supply.

High quality lighting inside and in the immediate vicinity of the shelter is also essential for efficient and safe operation and ensures that it can be used on a 24-hour basis. Externally, low energy

flood lights are the ideal choice and these can usually be supplied on telescopic columns to provide sufficient height for directing the light to flood the working area. Also consider lighting with battery back-up, as this offers even greater flexibility and a measure of independence from the generator. In addition to external lighting, this type of light can provide sufficient illumination for the interior of shelters if they are fitted with a white translucent cover. It is something to keep in mind when discussing requirements with your shelter supplier. Shelters with darker covers, such as military camouflage, will, of course, need additional interior lighting units which, on rigid shelters, are normally clipped into position on the overhead frame.

Breakthrough in Portable Air Conditioning (AC) Units

It is important to maintain an acceptable temperature and air quality within the shelter or decon system. To some extent this will depend on the external ambient temperature range, but the role of the shelter is also an important factor. The temperature for a temporary mortuary, for example, should be no more than 4°C and a shelter used for decontamination may need forced ventilation to stop dangerous gasses or vapours building up inside.

It is important to maintain an acceptable temperature and air quality within the shelter or decon system. To some extent this will depend on the external ambient temperature range, but the role of the shelter is also an important factor.

New lower energy mobile ac/heaters can be positioned alongside the shelter to feed temperature-controlled air through a recirculation flexible ducted system. This can be either cool air for hot climates or switch over to heated air as required.

New Levels of Containment

Emergency decontamination showers obviously require a water supply and way of removing the wash water. Low energy pumps are available to transfer the water to and from the shelter. Portable heavy-duty reservoirs can provide temporary water storage for showering, while contaminated clothing, equipment and waste water is best stored in collapsible palletised receptacles that can be transported by pallet truck and then stored flat taking up minimum space on rescue vehicles or in the warehouse. For the reservoirs, 5000 litres or 6000 litres are a practical capacity.

As already discussed, the use of chemical

additives to the water can significantly improve the efficiency of decontamination showering and has the added advantage of reducing the amount of water required. The resulting reduction in waste water volumes opens up the prospect of more efficient methods of waste management by using environmentally beneficial filtration or recycling techniques.

Conclusion

While considering the merits of inflatable and rigid frame shelters, it is the availability and suitability of ancillary equipment that may eventually determine which route you take. With the latest technology and the benefit of user feedback, manufacturers have refined their products to provide a much more targeted approach that delivers optimum performance for specific tasks while retaining flexibility in deployment to enable you to make the most of your investment.

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Andy Whitehead is Decon Manager at Hughes Decon Systems

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Are “Ex Certifications” to be trusted?

In April this year, a third party commissioned DEKRA Certification B.V in the Netherlands to test six brands of ‘intrinsically safe’ alkaline (4 x AA) powered hand lamps and to validate not only various performance claims but also to verify if the lights were compliant with the issued ATEX certifications. The results of the study – “Photometric and mechanical testing of six different type of professional torches” – are a cause of concern.

Urs Baeumle

Permalight (Asia)

In brief, the DEKRA test report documented that five of six flashlight samples did not live up to some of the performance claims. For example, grossly overstating lumen ratings, and three samples failed the immersion tests as water leaked into the battery chamber, in non-compliance with the issued ATEX certifications and IP ratings.

What is Intrinsic Safety?

To cause an explosion three elements must be present: Oxygen, flammable compounds and a spark or a flame. As general definition, equipment termed as ‘Intrinsically Safe’ is incapable of causing electrical sparks or sufficient thermal energy to ignite flammable compounds present in an explosive atmosphere, may they be gases, vapours or dust.

In battery-powered luminaries, three main components might cause a spark or a flame:

- Batteries might leak, gas out or short-circuit.
- Light source – incandescent bulb might break or explode; LED circuits can short-circuit and components may overheat or become faulty.
- Enclosure and material – electrostatic discharge can cause sparks.

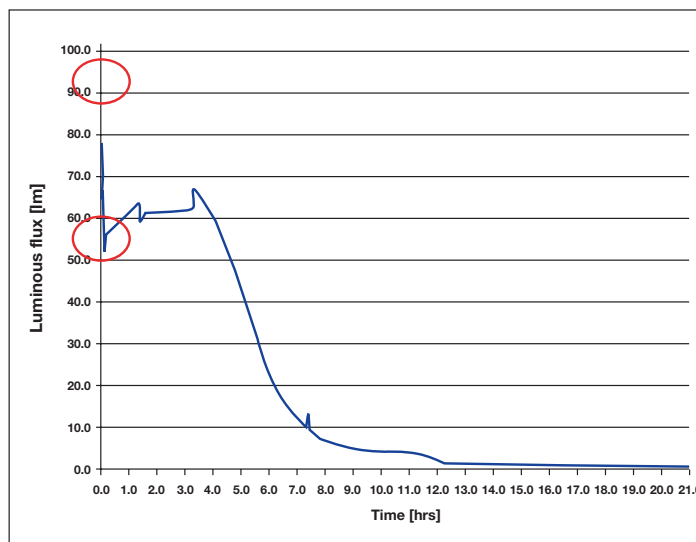
Batteries

Handheld flashlights and headlamps require a power source to operate; these can be rechargeable or non-rechargeable battery cells, for example Li-ion, NiMH, NiCd, alkaline or lithium. Batteries store energy to be released as ‘electrical power’, and depending on the chemistry, some batteries are more energetic than others.

Yet, batteries may leak over time, gas out or short-circuit damaging the electronics and the enclosure of the luminary. Gassing batteries are of special concern as there are risks that they might explode inside the compartment leading to injuries or, in the worst case, initiating a major explosion. ‘Safety gas valves’ seem not to offer much protection when batteries start gassing.

Light Source

As light sources, most handheld flashlights and headlamps use either incandescent bulbs such as Xenon, Krypton, or LEDs. Obviously, light bulbs can burnout or break when lit. Also, light bulbs will become very hot during operation – the brighter the hotter – heating up the luminary enclosure (and batteries), sometimes to critical



The graph shows the light performance using a direct driven LED circuit

temperatures sufficient to ignite flammable gases or dust. Therefore, light bulbs have to pass electrical and the housings mechanical and environmental stress tests before the light will be certified as 'Intrinsically Safe'.

Where luminaries include an LED light source, it is mostly ignored that LED chips not only generate considerable heat, they require an electrical circuit and a heat-sink to operate. The Achilles tendon of all LEDs is the electrical circuit that must be designed and manufactured in accordance to approved safety norms and standards in order that neither the circuit nor any of its components will short-circuit and cause electrical sparks.

Circuits

Incandescent light bulbs can be directly connected to batteries without having to take polarity into consideration. Therefore, the electrical circuit is rudimentary, consisting of a bulb, batteries, contacts and likely a switch.

LED emitters are diodes allowing the current to flow in one direction only. In a very simple circuit,

LEDs are direct driven, similar to a light bulb. Alternatively and more expensive is to drive the LED with a regulated circuitry. But which of the two is more efficient and safer? Performance wise, the LED with the regulated circuit will fare better than if direct driven; however, electrical safety can only be guaranteed if the regulated circuit includes current limiting resistors, a fuse, and is reverse polarity protected. In addition, all components that might heat up must be insulated, creepage between conductive tracks must be avoided and clean and solid soldering is a prerogative.

Considering the above two circuit types, it is important for the user to know:

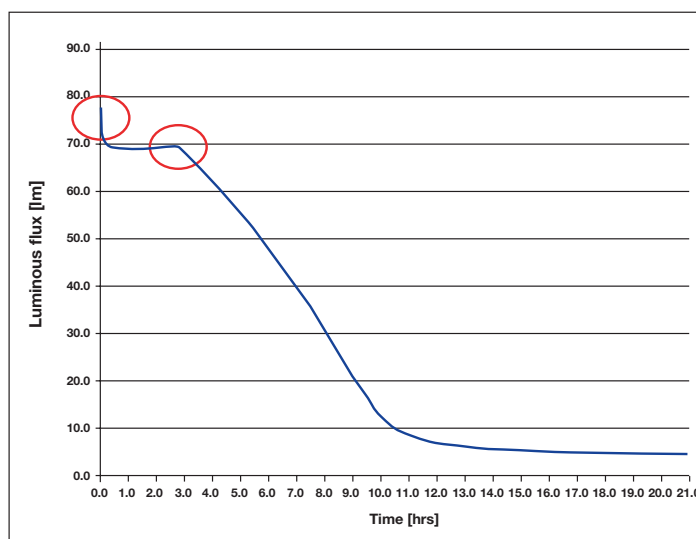
Direct-driven LEDs are connected directly to the batteries and will be very bright in the first few minutes but then lose rapidly around 50 percent of the light power. The graph shows the drastic drop in luminous flux from 96 lumens to 53 lumens within a few minutes (it is worth noting that the DEKRA-tested sample is advertised as emitting "200 lumens"). For cost considerations and simplicity of engineering, the majority of "intrinsically safe" lights rely on direct driven LED circuits.

IC-controlled LED circuits regulate the current supply either by pulse modulation (PWM), constant current (CC) or alternatively by applying constant voltage (CV); in other words, a microcontroller constantly senses and optimises the forward current respectively forward voltage applied to the LED, keeping the light output constant and so reducing negative thermal effects. The conclusion is that IC controlled LEDs are safer and show a far better performance than direct driven LEDs.

Enclosures

Enclosures of intrinsically safe lights are predominantly made of plastics; these might have conductive or non-conductive properties. Non-conductive polycarbonate (PC), for example, Lexan, is the most common and cost effective plastic. Conductive anti-static materials like carbon fibres and "XAG" are expensive and preferred if lights are to be certified for safe use in highly explosive atmospheres, such as those with Nitrogen gas. Before a flashlight can be certified as 'Intrinsically Safe', the entire enclosure has to pass various laboratory tests that include impact and drop tests, water and dust immersion (IP rating) and, depending on certification, temperature stress and electrical resistivity tests.

IP ratings indicate the level to which the flashlight is water and dust proof. Water immersion is part of the 'product certification tests'. After the tests, the product will be IP rated, such as IP 67



The graph shows the light performance with a safe IC controlled LED circuit

or IP 68. For example, IP 67 certifies that the product is "Dust Tight" and suitable for "Immersion up to one metre". In the mentioned DEKRA report, three out of the six flashlights failed this one-metre immersion test, despite two vendors are claiming that the affected models are "suitable for diving".

Norms, Certifications & Inconsistencies

The above comments refer predominantly to ATEX, which stands for "Appareils destinés à être utilisés en ATmosphères EXplosives"; ATEX applies mainly to the European Community. However, countries, such as the US, Canada, Australia, Russia and Japan all implement different directives – UL, FM, ETL, IECEx, TIS, to mention a few. It is outside the scope of this paper to explain the nuances and differences of these directives other than to state that the general product test methods follow and apply schedules similar to ATEX. In accordance to the various certification schemes, 'Intrinsically Safe' products can only be distributed if the facilities of the certified vendor are audited by a Notified Body.

However, vendors that market "Ex certified" lights under their own brand may not necessarily be the original manufacturer, instead employing uncertified subcontractors in third countries. Most subcontractors do not have any 'Ex' quality assurance module in place and the production facilities are not inspected and audited by any Notified Body. In other words, US or European vendors may purchase flashlights either as "complete knocked down" (CKD) kits or as finished products from unnamed and uncertified subcontractors located in different jurisdictions.

In case of CKD kits, the vendor assembles the parts at his facility and sells the products as "intrinsically safe lights" under his own brand certified by a Notified Body in his name. On the other side of the coin, customers purchase, in good faith, a 'branded and Ex certified' flashlight or headlamp that might turn out to be unsafe if used in hazardous areas. For example, an unnamed European "Ex certified" company markets an alkaline battery powered headlamp certified to ATEX "II 2 G Ex ia T4"; "ia" approves the lamp for Gas Zone 0, an area in which explosive gases are continuously present. However, the LED board is made by an "Ex" uncertified subcontractor. The circuit does not include any current limiting resistors or a fuse, components are without insulation and conductive tracks are closer than permitted risking certain current creepage. And yet, the head lamp was approved and certified by a Notified Body in Germany.

Conclusion

The previously mentioned DEKRA report and the cited examples should sound alarm bells to users who operate luminaries in hazardous areas. Flashlights and headlamps branded with Ex certifications are no guarantee that the lights will perform as advertised or will be truly safe for



deployment in potentially explosive atmospheres! The reasons are:

- **Notified Body**

To be certified as 'Intrinsically Safe', products must comply with specific norms and standards such as ATEX; nevertheless, it is left to the interpretation of the Notified Body how to implement these. For safety reasons, and in order to avoid ambiguity, it should be made mandatory that only products can be called and marketed as 'Intrinsically Safe' if the entire production chain, including the vendor and the main subcontractor that supplies electronic boards and LED modules, is audited and certified by a Notified Body.

- **Certifications Definitions**

The various definitions, nomenclature and letterings classifying intrinsically safe products are confusing to most users. As example, US and European norms apply different criteria: "classes" versus "zones".

- **Vendors**

For marketing purpose some vendors tend to overemphasise product performance. To be competitive and/or lack of electronic engineering, many 'Ex certified' vendors purchase electronics modules, such as complete LED assemblies or even the entire product, from 'Ex' uncertified subcontractors without having direct control over production, product quality and safety.

- **Users**

Price driven, many customers put a lower priority on safety, as long as the product is branded and carries some kind of 'Ex' certification. However, users are well advised to select only 'Ex' luminaries that are certified by two different organisations such as ATEX and IECEx.

- **Legal Implications**

In the event that an 'Ex' certified luminary causing an accident, fire or an explosion, the above comments lead to the conclusion that the user will, at the end, bear all responsibilities and liabilities. One of the many legal but not hypothetical questions is what will happen if a Notified Body has its accreditation suspended or revoked? Will the products certified by this very organisation have the 'Ex certifications' invalidated so that the products cannot be distributed any longer as "intrinsically safe" luminaries? The answer remains open.

IFF

Urs Baeumle is Managing Director of Permalight (Asia)

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ADVERTISERS' INDEX

Alert Disaster Control	4
Angus Fire	53
Argus Thermal Imaging	49
AWG Fittings	25
Bauer Kompressoren	68
Bristol Uniforms	35
Con-Space Communications	43
CTE Lift	24
Dafo Fomtec	IBC
Devon & Somerset Fire & Rescue Service Training Academy	20
Dr Sthamer Hamburg	9
Dynax Corporation	50
Emergency Services Training Institute (Texas A&M)	76
FDIC 2013	2
Fire Service College	15
Freidrich Seiz	70
Goliath Footwear	32
Haagen Fire Training Products	23
Helmet Integrated Systems	32
Isotemp	10
Iveco Magirus	60
Kenex Engineering Ltd	23
Kussmaul Electronics	13
KV Fire Chemicals	55
Lukas Hydraulik	56
Mobiltex Escape Systems	37
On Scene Solutions	16
PAC Fire Australia	26
Pacific Helmets New Zealand	31
Paratech Inc	63
Plastika Akrapovic	29
Plastisol	63
Rosenbauer International	OBC
Scott Safety	64
Skedco Inc	7
Super Vacuum Manufacturing	76
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Transtec Simulators/Angloco	19
Unifire Power Blowers	11
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Contents



21-22

7-19 News & Profiles

21-22 New Building will Boost Fire Behaviour Training

25-27 The A-Foam Authority



25-27

29-31 First Response, Rapid Intervention

35-38 Offshore Training - Setting the Standards



46-49



51-55

41-44 Flammability & Degradation of Fuel-contaminated Fluorine Free Foams

46-49 CBRN: Ensuring the Right Response

51-55 Disaster's Unpredictability



56-58

56-58 The Power to Perform

61-63 "Fail To Prepare, Prepare To Fail"

64 Advertisers' Index



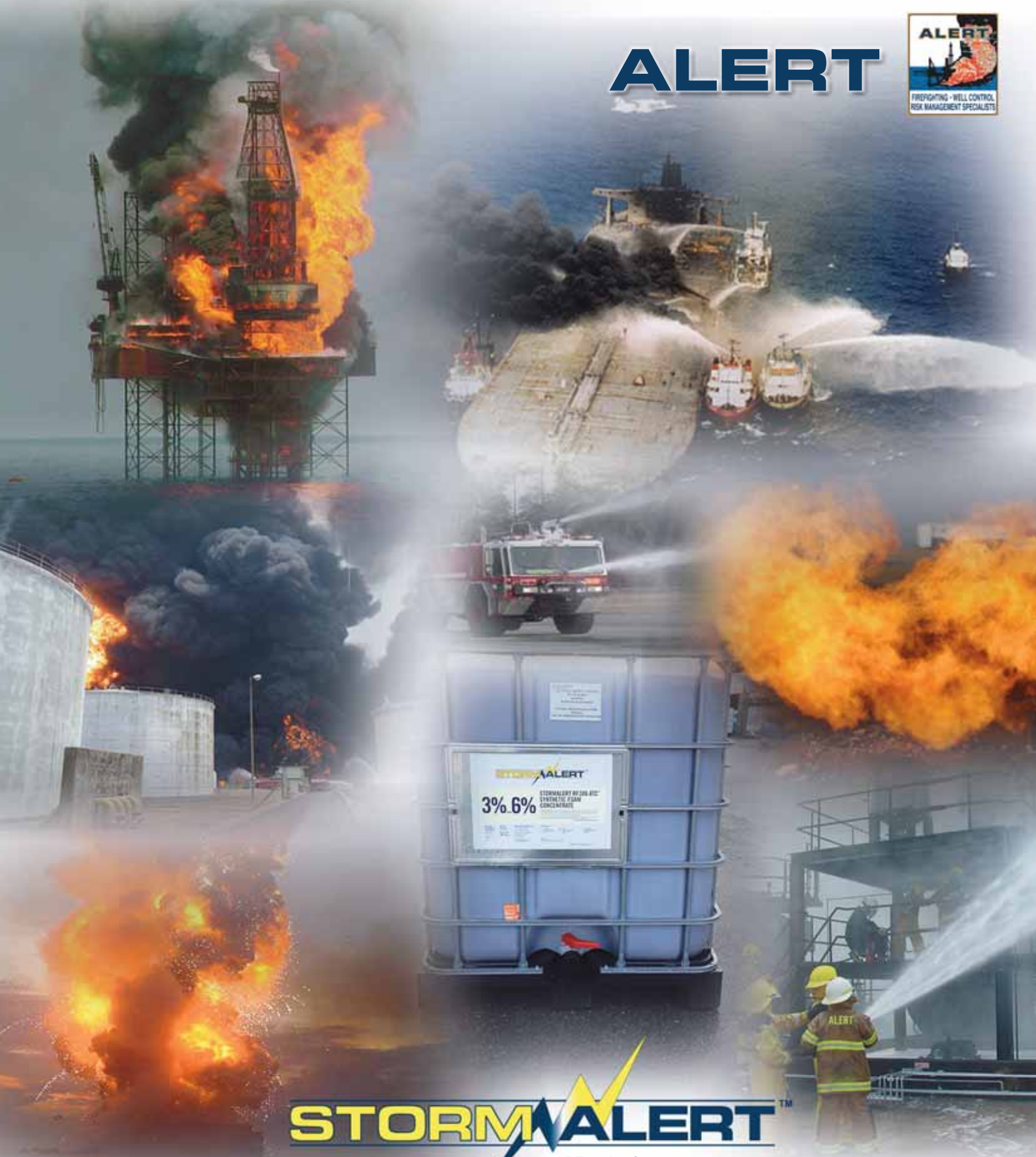
61-63



35-38

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Science to the Rescue

Two items in the news struck me recently, both of which may have far-reaching implications for firefighter safety. One item related to a somewhat lifelike robot firefighter called Octavia; the other item referred to a robotic firefighting machine called Thermite that resembles a cross between a mini version of a battle tank from the First World War and the K-9 fictional robotic canine in the long-running British science fiction television series, Doctor Who.

Now I accept that, at first glance, these two inventions may seem nothing more than whimsical space fillers for a newspaper with a few column centimetres to fill, but serious thought has clearly gone into both inventions.

Octavia, for example, was developed by scientists from the US Naval Research Laboratory, working in partnership with the US Office for Naval Research, to tackle particularly dangerous blazes on-board military ships. It uses infrared cameras to 'see' the blaze, then shoots suppression agent at the flames that is stored on its back. Thermite was developed by Howe and Howe Technologies in the USA with funding from the US Department of Homeland Security's Technology Foraging initiative. It has a similar objective to Octavia; to reduce the exposure of human firefighters to extreme fires, such as fuel explosions, chemical leaks and nuclear meltdowns.

True, from a first reading of these press reports it looks as though Octavia at least has some way to go before its passing out parade with the US Navy. The design currently lacks the responsiveness necessary to help in a genuine emergency; particular attention is being paid to improving the naturalness of interactions with humans and the robot's ability to recognise the way fire spreads to better extinguish the blaze. Thermite however is already being marketed in the USA.

But what particularly struck me when I read about both inventions was not so much what they do or how they do it, but how long it seems to have taken us to get to this point. Considering that devices have been in operation for years that trundle across the Moon collecting rock samples,

that robotic weapons are commonplace for SWAT teams, and that robots have long been used by bomb disposal specialists, why has it take so long to get around to think about using them for firefighting? But now the robotic firefighting genie is out of the bag, so surely we are likely to see more of these devices?

Undoubtedly, these machines are expensive – the report I read suggested that the Thermite costs several hundreds of thousands of dollars – and are not appropriate for every type of fire or even every firefighting agency. They do though seem to offer the very real prospect – albeit some way off – of putting fewer firefighters' lives at risk when tackling particular high hazard fires or explosion risks. Surely that is to be applauded, embraced and encouraged; we should welcome these endeavours and work closely with the robotics industry to produce effective and more financially available machines.

I think today's generation of firefighter needs lose no sleep whatsoever about being replaced by robots. But it is interesting to think that the vast majority of technical developments in the industry (although by no means all – for example the Wildfire Automated Suppression and Protection System or WASP automated wildfire protection system reported recently in this magazine and Asia Pacific Fire magazine) have been focused on improving firefighters' personal safety and making them more effective, rather than finding ways of removing the firefighter from the fire itself. With Octavia, Thermite and the like perhaps that will change. Maybe they are what the future will hold for the firefighting industry.

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Quiroga Firefighting & Emergency Vehicles

QUIROGA TRUCKS was founded in 1980 by Fire Chief Juan Antonio Quiroga. Due to the immediate needs in his own fire department, Juan Antonio started to build his own trucks in Salamanca, Guanajuato, Mexico (a mid-size city in the centre of the country). His son, Juan Carlos Quiroga, now leads the company.

The growth of Quiroga Trucks has been consistent and steady, but with a solid understanding of firefighting and engineering depth, with the result that excellent fire apparatus and ambulances are being produced. Quiroga proudly displays ambulances and fire apparatus at the FDIC each year and has expanded sales on a world-wide basis.

The company's product line is very broad in scope and includes: initial attack vehicles, commercial and custom pumpers and aerials, industrial pumpers, tankers, wildland vehicles, rescue, ambulances, special service support vehicles, and aircraft rescue and firefighting ARFF vehicles of all sizes. The Quiroga production facility now exceeds 8400 square metres. The plant includes a UL pump test site and a "tilt table" for NFPA testing; facilities and is currently being expanding for ARFF vehicle testing.

A new USA division, named Qualified Fire Tech, in McAllen, Texas has been established to support growing operations, purchasing, and service co-ordination. Over 80 percent of Quiroga materials originate from USA-based companies such as: Darley; Akron; Pro-Poly; Spartan chassis; Kussmaul/NewMar; Hale; Class 1; Weldon; Fire Research; Code 3; and other major suppliers.

Today, Quiroga's quality now far exceeds cus-



tomers' expectations. Continual improvement in manufacturing processes and equipment, introduction of new innovative materials and suppliers, and 3-D CAD engineering has resulted in a world-class emergency product offering. The heart of these quality improvements has been guided by meeting NFPA standards, expert consulting services, and Underwriters Laboratories' certification of pump and aerial testing at the facility. It is truly exciting times at Quiroga Trucks with plant expansions, new personnel resources, new manufacturing equipment, increased sales, and a solid 'family team'. The future is certainly bright. **IFF**



For further information, go to
www.quirogatrucks.com

Red One Limited

Support services for industrial fire and safety projects worldwide



Red one is a newly established trading company of Devon & Somerset Fire & Rescue Service, the UK's largest non-metropolitan fire service. The company provides industrial subcontracting, standby rescue, fire equipment commissioning/testing, fire and safety training and consultancy services for businesses both within the UK and overseas and all income generated by the company is used by Devon & Somerset fire authority to maintain and improve the ongoing safety of their local community and fire fighters.

The product and service offer from Red One includes industrial firefighting, disabled aircraft recovery, maritime fire-fighting training and specialist safety provision for working at height, confined space or water rescue. The company is also developing specialised training courses for the renewable energies sector.

Red One has access to over 200 fire fighters, instructors, trainers and consultants, fully trained to UK national fire-fighting standards, who are ready, willing and able to provide business and industry with expert knowledge and flexible crewing on short, medium or long term projects anywhere in the world!

From commissioning and testing of fire systems at oil pumping facilities in the Middle East to the development of fire training courses in India or the provision of temporary fire stations at major music festivals and air shows, Red One can offer the support services that business and industry need. Whether it is a full time on-site industrial fire provision or a certified fire awareness course for office staff, a complete incident control system for business continuity management or simply a training course to improve resilience, the fire and safety expertise and resources available from Red One are designed to deliver these requirements.

Red One also offer highly trained and experienced standby rescue teams available for contract work to ensure a safe working environment for staff, and to help clients meet their legislative obligations under such statutes as the Work at Height Regulations 2004 and Confined Space Regulations 1997. In addition, the company also provides standby rescue boat teams for construction or project work that has a specific water risk.

Businesses benefit from Red One's locally based support and maintenance framework which allows them to provide an extremely efficient service, coupled with cost-effective training and competence management, and the ability to react quickly to any maintenance and HR issues as they arise.

One area that Red One has worked in successfully is the Oil and Gas sector in the Middle East. Red One were contracted to provide training instruction to on-site fire fighting crews on the recently opened Abu Dhabi Crude Oil Pipeline. Part of this instruction included training on specialist vehicles and fixed fire fighting installations.



Leadership & Incident Management and Control

With Red One's core experience in major incident management and control, the company is also able to assist with major incident scenario exercising and plan testing. Through bespoke scenario based exercises, in either practical or table top forms, Red One helps organisations test their plans at operational, tactical and strategic levels. They work with each client to make sure that all objectives are met and developmental needs are identified. One such client, managing a large Power Station in the South West UK, utilised these services to help their management team gain a better understanding of dealing with operational incidents in a fast-moving, complex environment.

Accredited Training

Through Red One's association with Devon & Somerset FRS Training Academy one of the key parts of their business is the provision of specialized training services. The training academy provides the highest quality training and competence management solutions, training both commercial clients and many of the UK's Fire & Rescue Service staff.

The DSFRS training academy consists of several 'schools' including:

- Fire Fighter School
- Access and Rescue School
- Maritime School
- Fire Behaviour School
- Fire Safety School
- Driving School
- Aviation School
- Leadership School

Through the DSFRS Training Academy, Red One provide a number of accredited courses from institutions such as BTEC and City and Guilds, as well as bespoke courses tailored to suit specific industrial needs.

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For further information, go to
www.red1ltd.com

New Fire Behaviour Training Centre



Construction work is underway on a new fire behaviour training centre at Exeter International Airport in the UK for the DEVON & SOMERSET FIRE & RESCUE SERVICE. It is due for completion in spring 2013.

When completed, the new facility will be used for fire behaviour training and hot fire and foam training. The facility will also include mock-up houses and an aeroplane to practice specialised firefighting techniques. The site will also accommodate an emergency command unit, welfare facilities, lecture theatres and general administration.

For more information, go to www.dsfire.gov.uk

New Single Stage Fire Pump

WATEROUS has introduced the new Passport single-stage fire pump that meets both EN 1028 and NFPA 1901 compliance requirements creating, the company claims, a new benchmark for international pumps.

The new pump has an oil-free primer and self-lubricated sealed bearings, built-in automatic primers with manual shutoff; it weighs less than 91 kilogrammes and delivers up to 3,000 litres-a-minute at 15 bar. The new Passport comes with a five-year warranty.



For more information, go to www.waterousco.com

Quality Management

Fire rescue saw manufacturer, CUTTERS EDGE, has received ISO-9001 certification for the quality management systems used at its headquarters and manufacturing facility in Baker City, Oregon, USA.

For more information, go to www.cuttersedge.com



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Fluorine & Organohalogen Free Firefighting Foam

LHR Airports Limited Rescue and Fire Fighting Service (RFFS) has recently renewed its firefighting foam contract and, after much research, has taken the decision to purchase an ICAO Level B compliant fluorine and organohalogen free product.

In line with LHR Airports Limited's environmental policy of reducing the impact of aviation on the environment, it decided to research the feasibility of procuring an operationally compliant, environmentally friendly firefighting foam. The first step in the process involved consulting with the UK's Civil Aviation Authority (CAA), before exploring the availability of such products within the aviation firefighting sector. The whole process was supported by LHR Airports Limited's procurement department to ensure objectivity and impartiality throughout.

LHR Airports Limited's RFFS insisted that the main criteria for selection must be operational effectiveness and compliance. As a result, foam manufacturers were asked to provide details of the ICAO Level B compliant fluorine/ organohalogen free foams that they supplied. Once a list of foam concentrates that met those requirements had been collated, manufacturers were invited to give a presentation about their product and company to the LHR Airports Limited team set up to manage this project.

The project management team comprised personnel from the RFFS and LHR Airports Limited procurement and environment teams. This part of the process enabled LHR Airports Limited to establish how a particular company would be able to support the RFFS operation through partnership rather than just



Graeme Day is Group Fire Service Compliance Manager at LHR Airports Limited

supply. The presentations were scored using the LHR Airports Limited procurement template, which ensured that an objective result was obtained.

Following the presentations, a shortlist was established and the listed companies were invited to subject their products to a firefighting performance test. The test was carried out by an independent, accredited test laboratory and witnessed by LHR

Airports Limited personnel, CAA personnel and representatives from the relevant foam companies. All test results were later forwarded to the LHR Airports Limited project team for consideration.

Using a non-disclosure agreement drawn up by LHR Airports Limited in consultation with shortlisted foam manufacturers, LHR Airports Limited's environment team was able to analyse the chemical make-up of each foam sample. This ensured that LHR Airports Limited could be certain that the products under consideration did not pose an environmental threat to the infrastructure of LHR Airports Limited's airports.

Information and scores from supplier presentations, operational effectiveness tests and environmental analysis were collated and examined by the foam project management team. Based on the information as a whole, a decision was then made to award a contract to Angloco Limited for the procurement of Dr Sthamer's Moussol FF fluorine-free foam, an ICAO Level B compliant fluorine/organohalogen free foam that met LHR Airports Limited's operational and environmental requirements. Delivery will take place during 2012 to coincide with the phased delivery of a new fleet of RFFS vehicles.

For further information, go to www.heathrowairport.com

New PPE Suit

ROSENBAUER has introduced what it describes as "the completely new design" Fire Max 3 that is said to provide extremely low water vapour transmission resistance with the result that perspiration is expunged from of the suit very rapidly while optimum protection is retained. Heat accumulation is largely prevented and moisture evaporates quickly into the atmosphere. Rosenbauer has also introduced a PTFE membrane for the first time, which provides excellent heat and flame resistance ratings.

The new three-layer material design of the Fire Max 3 achieved a low value of 15 m²Pa/W during resistance to evaporating heat transfer testing. This contrasts with the water vapour transfer resistance of ≤ 30 m²Pa/W generally required in the highest class by the current standard. In spite of this high level of breathability, the Fire Max 3 also has a safety thermal lining in order to provide excellent protection even in extreme conditions. Fire Max 3 weighs just 3.1kg (size 48-50)

The new Fire Max 3 is available with two outer fabrics options: PBI Matrix in golden yellow, and Nomex Tough in dark blue and gold. The outfit has numerous pockets, holders for lamps and



badges of rank, ergonomically designed knees and elbows and removable trouser suspenders and zips. New Nomex knitted cuffs with thumbholes can be added to the sleeves, in order to prevent them from sliding up the arms.

For more information, go to www.rosenbauer.com



BA Challenge

Firefighters from across the UK recently took part in what DRAEGER reckons was the biggest ever breathing apparatus challenge.

The fifth BA Challenge was held at the UK's Fire Service College to demonstrate best practice and put firefighters' skills to the test, as 17 teams from around the UK pitted their wits against each other in a series of tough challenges. The teams were assessed in a number of realistic scenarios including incident command, fire ground procedures, entry control and use of breathing apparatus across three venues at the college. For the first time, participants from UK fire brigades were also challenged to compete in a fastest time competition, within its confined space entry trailer.

For more information, go to www.draeger.com

New Airport Firefighting Fleet announced

Scottish airports operator, HIAL, has announced plans to replace its fleet of emergency firefighting vehicles with 20 fire appliances over the next five years. The new fleet will be built to HIAL's technical specifications by the Spanish Iturri Group and include a mix of 4x4 and 6x6 vehicles. The new vehicles will also conform to the latest EU emission standards, and are expected to have a life expectancy of 20 years.

HIAL employs more than 200 firefighters across its 11 airport, and the Civil Aviation Authority (CAA) recently approved a bid by HIAL to become the first airport operator in the UK to provide in house, on-site training for its firefighters.

For more information, go to www.hial.co.uk

Environmental Management Accreditation

ARGON ELECTRONICS, which develops and manufactures hazardous material detector simulators, has been accredited to ISO 14001:2004, the globally accepted standard for an Environmental Management System developed by the International Standards Organisation.

For more information, go to www.argonelectronics.com

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Haagen PPV Trainer

Learn How to Control Ventilation

The Principle of Positive Pressure Ventilation Training

Firefighters use a variety of tools and techniques to battle structural fires. One of the least understood yet potentially effective tactics when properly used is positive pressure ventilation (PPV).

The basic principle behind PPV in structural firefighting is to force the movement of smoke and heated gases through the structure by means of utilising a fan to move air from the exterior of the structure and forcing it into the interior. This action increases the air pressure on the interior to a level greater than the pressure outside the structure. As a result, smoke and heated gases will be forced out of the structure through the closest vent.

This process creates a path of moving air that travels from the fan to the vent. Any smoke, fire, and gases in this path will be pushed towards the closest vent, whether that is a window, door, or a roof vent. Firefighters control this path of air by making strategic ventilation openings in the areas of the structure they wish to ventilate by opening windows, doors and making roof cuts. PPV allows firefighters to systematically clear the structure of smoke, toxic fumes and superheated gases, all of which are a recipe for a potential flashover. The purpose of PPV is twofold; create greater visibility for the firefighters to conduct interior firefighting operations and remove the conditions that provide the foundation for a flashover, saving both lives and property.

HAAGEN PPV Trainer

In order for PPV to be effective, training in the proper use of positive pressure ventilation is critical

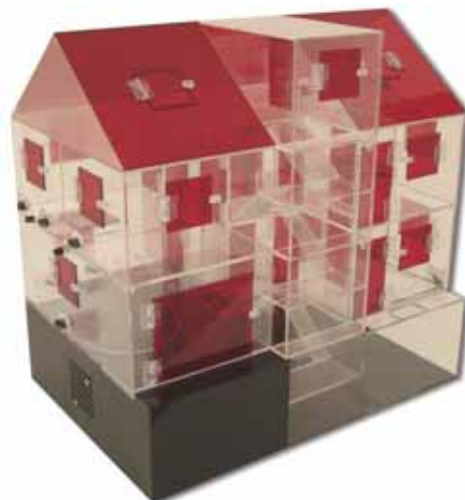


to the success of the operation. In response to the demand from firefighters for PPV training, engineers at HAAGEN designed and manufactured the PPV Trainer, a three dimensional table-top demonstration training system. HAAGEN is a leading global manufacturer of fire and safety training tools that allow professional instructors to conduct realistic and effective hands-on training exercises.

The HAAGEN PPV Trainer is a see-through structure designed with clear walls and roof and red transparent doors that allow students to visualise the air flow and learn to control ventilation. The design features integrated working doors and windows and an internal smoke generator with an on-board smoke fluid reservoir that can be used to fill either the entire structure or specific rooms with non-toxic training smoke. The standard PPV Trainer encompasses a basement, first floor and roof for basic residential fire training, but the system can be customised with a variety of floor levels and floor plan configurations for more advanced training scenarios. A handheld controller operates the on-board smoke generator and fans. Trainees learn the basic concepts of fan placement for optimal ventilation, and learn first-hand the advantages and limitations of both negative and positive pressure ventilation.

HAAGEN has built an excellent reputation in developing innovative, effective and safe products for rescue and emergency services personnel. HAAGEN understands firefighter needs and is dedicated to helping the fire service train more efficiently to better serve the lives they protect – now and in the future.

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Firefighter's Innovative BA Safety Strap

Pete Broomfield, a firefighter with HAMPSHIRE FIRE & RESCUE in the UK who experienced the death of two colleagues while on duty has devised a lifesaving invention to prevent a similar tragedy occurring in the future. An inquest into the deaths heard that one of the key factors in the tragedy was fallen cables, which hampered attempts to escape from the rescue operations.



Peter Broomfield's solution is a special adaptation to prevent cables tangling themselves around the air cylinders on firefighters' backs. The strap is looped around the shoulder straps of the BA kit and the over the top of the back-plate. It sticks to the top of the BA cylinder with Velcro, so it forms a bridge between the cylinder and the back-plate. The Velcro attachment went through all the relevant heat testing to ensure it would not melt or warp while on the scene of a fire.

It has now been incorporated into all of Hampshire Fire & Rescue Service's BA sets and is now being deployed by other services around the UK.

For more information, go to www.hantsfire.gov.uk

Waterous Demonstrates the ONE STEP™ CAFS

Waterous, a global leader in fire suppression technology held its first ONE STEP™ CAFS demonstration at the Eagan Fire Station #2 in Eagan, Minnesota on October 11, 2012.


Representatives from Waterous and Eagan Fire Department watched as the ONE STEP™ CAFS delivered and engineered flow that was consistent, repeatable and accomplished by a push of a button.

One of the main problems with departments not using CAFS is the difficulty in operating a CAFS system. The ONE STEP™ makes it easy. No balancing valve to worry about, input hydrant pressure is not a problem as the system regulates the inlet pressure to a set level and with a push of a button, the system is creating compressed air foam.

Waterous equipped its Mobile Demonstration Units (MDU's) with the ONE STEP™ CAFS. Beginning in January, 2013, the MDU's will perform demonstrations across the country. To be one of the first to see the ONE STEP™ CAFS, sign up for a demonstration at <http://www.waterousco.com/training/ONESTEPDEMO.shtml>.

About Waterous

Revolutionizing firefighting since 1886, Waterous has been manufacturing the most reliable, performance-enhancing pumps, power take-offs, valves and hydrants the fire service industry has to offer. Based out of South Saint Paul, Minnesota Waterous manufactures its complete product line in the USA.



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UK Firefighters Answer UN Call

Firefighters from the UK's Devon and Somerset Fire & Rescue service answered the call of the United Nations Development Programme and travelled to Nepal to provide training to the country's fire service.

The Nepal Fire Service is ill-equipped, with firefighters often attending serious incidents without any protective clothing or adequate equipment, including breathing apparatus. There are very few fire appliances and access to water through a hydrant system is limited.

The UNDP has a five year co-operation agreement with the Government of Nepal to provide support to strengthen its disaster risk management, including improvements to the fire service. The team from Devon and Somerset provided training in firefighting techniques and identified gaps and priorities in the existing equipment provision. High priority has been given to organising the training of firefighter trainers, in order to increase their response capacity to fire disaster. The country is also prone to earthquakes but its preparedness to respond to major disasters is limited.

Firefighters from Devon & Somerset have been visiting Nepal for a number of years, and have donated protective clothing, equipment and vehicles – which are no longer up to stringent UK standards but still have value – to fire stations in Kathmandu.

For more information, go to www.dsfire.gov.uk

New Fire Hood

BRISTOL UNIFORMS has launched its own in-house design-and-manufactured fire hood range in what the company describes as: "a move to provide customers with bespoke PPE products to complement Bristol's growing range of fire coats and trousers". The new fire hood is available in two styles and colours.

The Bristol Fire Hood 1 is a two-layer construction using a PBI Gold Rib outer with an Aramid Viscose inner layer. The Bristol Fire Hood 2 is black and incorporates a double layer carbonised fibre/para aramid blend. Both new products are designed and manufactured to BS EN13911:2004.

Both products are described as: "superbly comfortable, providing improved fit in garments that are both breathable and wickable". Among the benefits claimed for the new fire hoods are that they are easy to put on and take off, and provide increased coverage to the shoulder area to reduce the risk of 'roll up' around the neck and when worn with a breathing apparatus mask. The flexibility of the fabrics used ensures full security in operational situations.

For more information, go to www.bristoluniforms.com



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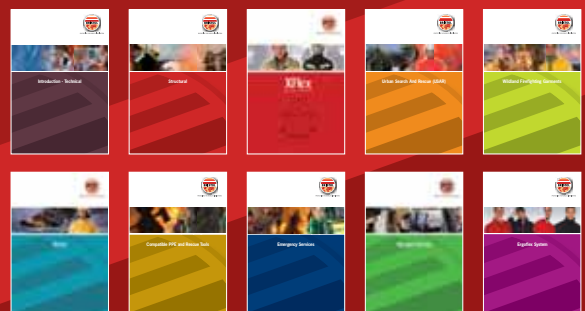
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New Argus Mi-TIC Camera Sets a New Mini Standard

The new ARGUS Mi-TIC from e2v is the world's smallest high-resolution thermal imager. Designed specifically for firefighting and rescue applications, it provides ultra-clear imagery, has a superb dynamic range and clear visibility in extremely high temperatures without whiteout. Mi-TIC can also see very low temperature objects, making it ideal for USAR and confined space casualty searches.

The demand for thermal imagers that are smaller, lighter and less complicated to use has resulted in e2v launching the new Argus Mi-TIC, the world's smallest high-resolution thermal imager that delivers the best image quality and clarity of any personal imager on the market. The ruggedly engineered Argus Mi-TIC is extremely light-weight – it weighs less than 750 grams – demands minimal training, and enables firefighters to see in conditions of zero visibility, including complete darkness, and smoke-filled environments. It is intuitive and simple to operate and no user maintenance is required other than cleaning the imager after use.

No software is necessary to download images; downloading images is as simple as downloading from a digital camera. An SD card in the Argus Mi-TIC can accommodate more than four hours of recording and 1000 images.

The new camera uses Argus' advanced digital imaging technology and boasts a 69mm LCD screen – one of the largest format LCD screen on a personalised style thermal imaging camera in the world. It can be held comfortably in the palm of the hand (Argus tested it using every known brand of firefighter glove) stored in a jacket for quick access, clipped outside a pocket, clipped to a lanyard or hung around the neck. It offers a simple thumb-operated on/off function with a superb start up time of under five seconds. On-screen features includes: spot temperature crosshair and reading live temperature bar; battery indicator; temperature sensitivity; and date and time.



It comes complete with Argus' unique dual use desktop dock/in-truck charger unit. This multifunctional charging unit charges the Argus Mi-TIC thermal imager and a spare battery when placed into the unit and locked into position. A maximum of six charger units can be daisy-chained together.

Optional features of the Argus Mi-TIC include customer configuration that allows the user to set up the camera to work according to their own procedures and protocols, while tri-mode sensitivity allows temperature variations as high as 1832°F (1000°C) and as low as 40°F (-40°C) to be imaged.

The dynamic range of the Argus Mi-TIC means that a casualty located in a very high temperature environment can still be seen by the camera's user. "One button" camera enables the user to set 'black box' recording on/off, while "three button" camera permits the user to set the function of the additional buttons for image capture, image freeze, switch application colour mode (firefighter and search/overhaul), and digital zoom. A whole raft of off the shelf accessories, such as a laser pointer or flash light, can be attached to the picatinny rail at the top of the camera. Thanks to the design of a quick-fit sun shroud, the camera can also be use outside in bright sunlight.

The new Argus Mi-TIC thermal imager incorporates temperature and compression safe lithium phosphate battery technology. There is a two-hour and four-hour battery option and the camera's battery pack allows it to be powered by off the shelf AA batteries, enabling the user to use the camera in an emergency if the rechargeable batteries have already been run down.

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RESQTEC

– A Record of Achievement

Established in 1972, RESQTEC Zumro B.V. is based in Lisse, The Netherlands, and is a leading multinational. With 40 years of experience RESQTEC is the most innovative manufacturer of rescue and aircraft recovery equipment servicing technical rescuers and aircraft recovery teams all over the world.

Our objective is to enable the rescue industry to operate under safe circumstances; to be capable and to be in control. Over the past four decades, we have positioned ourselves to become a service-oriented company, delivering the best equipment, education, service and support in our areas of expertise: heavy rescue, USAR, extrication and aircraft recovery.

All our products are similar in the way that they are all dedicated to save lives and to guarantee safe conditions for the rescuer. We are committed to deliver the best solutions by using the latest technologies in materials and engineering; to educate, but also to learn from the rescuer; to convert today's knowledge into tomorrow's success. Successful products, such as the NT bag, Q1 cutter, Octopus and R2S require a balance of creativity, innovation, a good understanding of the challenges in rescue operations and the power to execute. We believe that only when these elements work closely together one can truly achieve success.

RESQTEC Fast Facts

- Established in 1972, family owned.
- Corporate HQ is located in Lisse, The Netherlands.
- Founded by Axel Maarschalk.
- CEO is Jan Pieter Maarschalk.

Growth

RESQTEC is focused on innovation and education to transform rescue to be a safe and timely operation.

Contribution

RESQTEC strives to be a true innovative manufacturer that understands the complications of any rescue or recovery operation.

Key areas of contribution are to raise standards in our daily rescue operations, to increase understanding by education and sharing knowledge, and to develop equipment that exceeds the expectations of our rescuers.

History

It all started in 1972 when Axel Maarschalk and Hurst Performance agreed to a partnership, introducing the hydraulic rescue tool concept into the market. This partnership led to several innovations,



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such as the introduction of the spreader, the dedicated cutter and the ram. All of these changing the way you perform your rescue operation today.

In 1990 Hurst Performance and RESQTEC Zumro B.V. decided to dissolve their partnership. It is then that RESQTEC changed its strategy to become the most innovative manufacturer in the rescue industry with a clear focus on developing products that guarantee safe and – ideally – remote operation. The RESQTEC brand was definitively established when NASA and military organisations started using the Stem Light mast, a retractable light post. In 2005 Jan-Pieter Maarschalk, son of Axel, joined RESQTEC and was appointed CEO in 2011. With the clear focus on developing innovative solutions and educating, as well as learning from the rescuer by training, RESQTEC continues to be a leading manufacturer of rescue and recovery equipment.

Company Milestones

RESQTEC has a proud history of successfully fulfilling market needs, while continually raising standards in rescue equipment, due to its performance, technology, the materials used and ergonomic design. RESQTEC is responsible for designing and introducing the first hydraulic ram into the market; the smallest cutter in the world (it still is), the NT Bag, the unique integrated Octopus solution and much more. In addition to the manufacturing and distribution of hydraulic rescue equipment, RESQTEC also manufactures and delivers R2S, the world's best integrated aircraft recovery solution.

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For more information, go to
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All-Purpose Pump



The HOLMATRO SPU 16 BC Greenline is being heralded as the first pump that emergency workers can use anywhere, for any rescue operation. It is battery-driven and emission-free, and can be used in confined spaces such as tunnels and collapsed buildings without risk to rescue workers or victims. It also has a long running time offering 90 minutes during a common extrication, even with heavy-duty rescue tools. The pump's low noise level and eco whisper mode make it less stressful for victims and improve communication at a rescue scene.

The pump can be used at high altitudes and below zero temperatures – up to -20°C – and a housing protects all parts in wet weather conditions. It incorporates three-stage pump technology that delivers higher flow in the second stage enabling rescuers to cut through the B-pillar of an older model car in half the time it takes a two-stage pump. The third stage delivers lower flow yet higher pressure allowing cutting through hard, reinforced pillars in a controlled manner.

Equipped with single-hose Core technology, the new pump works with all current Holmatro hydraulic rescue equipment, delivering the same tool performance as other rescue pumps. When a hydraulic rescue tool is used with the SPU 16 BC Greenline, the pump speed automatically increases to maximum to ensure full equipment performance. When the operation is finished, the engine reverts to eco whisper mode, which keeps the pump running at idle speed and a low noise level. Because the pump does not have to be switched off in between operations, it is readily available for use again.

Holmatro has also introduced a quick fix and release bracket, which is currently available for all Homatro Spider range pumps and the SPU 16 BC pump. The bracket fits in any rescue truck and enables the pump to be pulled out and put back quicker and easier than ever before. It also protects the pump from damage during transport and saves valuable vehicle space.

For more information, go to www.holmatro.com

Operational Management System

INTERGRAPH, SOMEI (Société Méditerranéenne d'Etudes et d'Informatique) and SYSOCO have been selected to provide the operational incident management system for firefighting and rescue services in the Department of Hérault department in the south of France. Intergraph's computer-aided dispatch solution (I/CAD) will help to optimise the management of 70,000 events a year handled by the 3,600 firefighters of the Hérault Fire Brigade and Rescue Service.

The solution will contribute toward optimising information sharing and command orders between the command-and-control room at Vailhauques, north of Montpellier, the 75 response centres, mobile command posts, equipment and staff on missions as well as service partners.

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New Building will Boost Fire Behaviour Training



Jessica King

Devon & Somerset Fire & Rescue Service

The Training Academy at Devon & Somerset Fire & Rescue Service (DSFRS) is a UK leading fire and rescue training provider, offering the highest standard of fire behaviour and specialist rescue instruction to commercial businesses, individuals, other fire and rescue services and emergency services personnel to enable them to work safely and effectively in hazardous conditions.

The Academy comprises seven schools including Fire Behaviour, Access & Rescue, Maritime, Fire Safety, Firefighter Training, Command and First Aid. In July 2012 the Training Academy was awarded with the ISO 9001 certification. ISO (International Organization for Standardization) give an overview of its 9001 award: ISO 9001:2008 specifies requirements for a quality management system where an organization:

- Needs to demonstrate its ability to consistently provide product that meets customer and applicable statutory and regulatory requirements, and
- Aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements.

Brian Harvey is the Fire & Community Safety Training Advisor at DSFRS. He says: "We are very proud of this award. The Training Academy was set up in 2010 with the ethos to provide quality training solutions. With the Academy's quality management system now approved by the ISO auditors, this will reinforce our dedication to providing staff and customers with the highest standard of training".

The Training Academy has recently commenced construction work on a new development at the Fire Behaviour School, based at Exeter International Airport in the south of England. A formal ground breaking ceremony was held in August to celebrate commencement of the unique project.

The Fire Behaviour School is a UK leading BTEC-accredited live fire training provider, training in excess of 2,000 operational staff within the service and instructors from 43 UK and international fire



authorities. The £3.35 million construction contract is due for completion in spring 2013. The building will be used by the Training Academy to train its firefighters and other fire and rescue services. It will provide facilities for fire behaviour training and hot fire and foam training. The facility will also include mock-up houses and an aeroplane to practice specialised firefighting techniques.

Chief Fire Officer, Lee Howell, of Devon & Somerset Fire & Rescue Service, says: "The new facilities will improve airport and local authority firefighter training and the safety of the public. Professional training is a priority for the Service and this centre will provide us and the airport with an enhanced capability."

The Fire Behaviour School offers courses such as:

- **Compartment Fire Behaviour Training (CFBT):** A two-week BTEC-accredited Level 3 course that allows delegates to obtain the skills, knowledge and understanding to competently deliver CFBT training within their own service.
- **Compartment Fire Behaviour Training Refresher (CFBT):** This one-week BTEC Level 3 course allows delegates who have previously obtained a two-week CFBT qualification to refresh their skills and re-qualify.
- **Positive Pressure Ventilation (PPV):** This one-week BTEC Level 3 course allows students to obtain the skills, knowledge and understanding to competently deliver PPV and tactical ventilation training within their own service.
- **Industrial Fire Training:** Bespoke fire team training tailored to specific industry requirements.

- **Bespoke Courses:** Tailored courses are available to industry clients. Recently the Fire Behaviour School has trained the South West Ambulance Hazardous Area Response Team (HART) and Hinkley Point Power Station.

In 2011 the service embarked on a successful relationship with Hinkley Point Nuclear Power Station. Their needs were specific and as a result a bespoke training package was tailored to suit them. A course was created for the Hinkley Point Team Leaders and the Stand-by Emergency Response Teams (SERT). Watch Manager Steve Hunt says: "Throughout all of this training the feedback we received from the students was very positive". Chris Dixon from Hinkley Point comments: "The course was excellent with life-like facilities and good instruction".

The Training Academy has continued to devise and deliver bespoke courses for Hinkley Point throughout 2012. Chief Fire Officer Lee Howell adds: "Our breathing apparatus instructors are highly-regarded on a national level and we will continue to train firefighters and commercial clients from all over the country and Europe through our Training Academy. We have a national and international reputation and our courses are accredited and quality assured."

The Fire Behaviour School already has a base at the airport, which was established in 1997. Due to the practical nature of the training, the space needed and the generation of smoke on a daily basis, the Airport site was chosen and is approximately two acres. Tam Alford, Group Manager at the Training Academy says: "The site has been developed over the past 12 years with the addition of classrooms, shower, changing facilities and a compressor, with funds generated from running external instructor courses. The new investment will represent a major enhancement of those facilities". The site will also accommodate an emergency command unit, welfare facilities, lecture theatres and general administration.

Matt Roach, Managing Director of Exeter Airport, welcoming the development: "The joint fire training ground is a unique development and is hugely positive in terms of the training resource that can be provided for both the Devon & Somerset Fire & Rescue Service and the Airport Fire Team." He continues: "We have a very good relationship with Devon & Somerset Fire & Rescue Service, and see this as a milestone initiative within the UK Fire & Rescue Services which will take the training facilities at the airport to a new level."

Martin Dowse works at the Fire Behaviour School. He adds: "Currently the steel frames of the main building are complete and the brick and concrete walls are rising up at a rapid rate. The concrete pan area where the Aircraft Simulator will be placed has all its special drainage in place. The Hot Fire training areas are also nearing completion with the Cold Villa now reconfigured and all the Attack and Demo Containers now in operational training. The New Hot Villa is still under construction off site but we anticipate its arrival in the near future". Martin concludes "This new build is an exciting time for all and we are looking forward to further enhancing the quality of our facilities to be on par with the high standard of training offered. At the moment we do have a waiting list for some CFBT and PPV courses so it is best to plan ahead and book future courses with us well in advance".

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Jessica King is Training Academy Project Support Officer at Devon & Somerset Fire & Rescue Service

For further information, go to www.dsfire.gov.uk/trainingacademy

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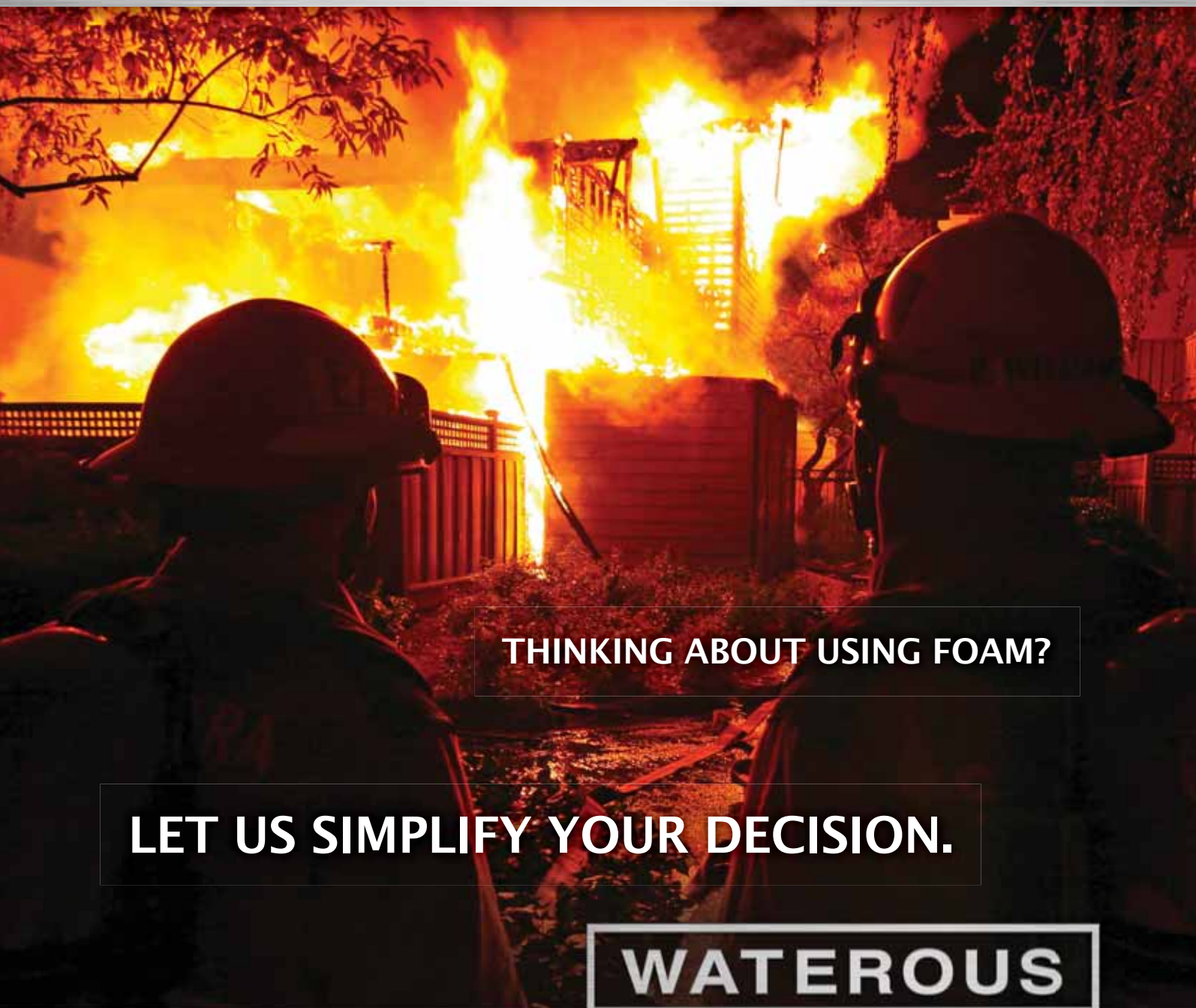
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The A-Foam Authority



Keith Klassen

A-Foam Authority

Most firefighters do not have a solid understanding of how and why Class A foam works, or how it can benefit their fire ground operations and safety. The A-Foam Authority, has been established to address these issues and assist fire departments in determining how best to apply foam technology in their department and their specific target hazards.

Class A foam is a valuable tool in the firefighter's arsenal. The use of Class A foam and compressed air foam systems has been slowly gaining popularity throughout the fire service over the last three decades. The objective in using Class A foam is to make water work better. Class A foam concentrate is a surfactant, or a "surface active" agent. When added to water, it reduces the surface tension of the water. This allows the water to spread into a thin sheet, increasing its surface area.

Because heat is only absorbed by the surface of the water, the increased surface area leads to quicker absorption of heat. Reduced surface tension also allows the solution to penetrate better into fuels. Surfactants also have an affinity for carbon. Adding surfactant to water makes the water "carbon loving." This keeps the water in contact with the fuels longer, providing more heat absorption and an increase in fuel moistures.

Foam bubbles are created by agitating air together with the foam solution, which is a combination of water and foam concentrate. These bubbles can be made in various forms, wet to fluid

to dry, depending on the tactical application required. Wet foam resembles melted ice cream; it is wet and sloppy and water drains out of it quickly. It is used for extinguishing fire, mopping up and raising fuel moistures. Fluid foam looks and feels like shaving cream. It holds water much longer and is used to protect exposures. Dry foam contains a large volume of bubbles with very little water content. It can be used to fill void spaces such as attics or areas under decks.

There are many reasons to use Class A and compressed air foam. All of them apply in some respect to all fire departments. The importance of each however will vary depending on a particular fire departments organisation, staffing levels, equipment, location, and target hazards.

- **Firefighter safety:** providing additional firefighter safety is the most important reason for a fire department to adopt the use of Class A foam. Because foam is a more efficient extinguishing agent than water it allows firefighters to extinguish the fire quicker thereby being exposed to the situation for a shorter period of time. The high energy of a CAF stream provides



a longer reach, allowing firefighters to operate farther away from the incident in a safer location.

- **Limited manpower:** compressed air foam does not replace manpower; people are still needed to perform fire ground operations ranging from fire attack to search and rescue, to ventilation and overhaul. It does allow the first arriving firefighters to do more in the first few minutes of the incident, which in turn positively affects the remainder of the incident.
- **Limited water supply:** when water supply is limited the use of foam extends the capability of the water supply. This may be a critical factor when no water supply is available and firefighters are relying on the water that they are carrying.
- **Wildland urban interface situations:** it may be multi-million dollar homes in heavily forested areas or simply overgrown vacant lots where a brush fire can threaten adjacent structures.



Compressed air foam is very effective when used to protect homes and other property that are exposures in interface situations. Structures can be protected with a layer of foam and firefighters can move to a safe area before the fire arrives.

- **Improved fire investigation:** because foam is capable of quickly extinguishing the fire, less evidence will be destroyed leaving more for the investigator to examine. The lower total volume of water applied also leaves more of the evidence in place.
- **Environmental impacts:** lower volumes of water used means that less fire debris is washed out into the environment. Class A foam's attraction to carbon tends to remove carbon particulates from the smoke thereby keeping them out of the atmosphere.

In spite of these benefits many fire departments cite a variety of reasons not to use Class A foam. Some common reasons are:

- We have always used water.
- We have lots of water.
- We have lots of manpower.
- CAFS is too complicated to use.
- Foam is too expensive.
- It takes the fun out of firefighting.

It has been my experience that most firefighters do not have a solid understanding of how and why Class A foam works, or how it can benefit their fire ground operations and safety. This understanding is integral to both the acceptance of foam technology and the ability to properly operate both nozzle-aspirated foam systems (NAFS) and compressed air foam systems (CAFS).

The A-Foam Authority

This misunderstanding is due in a large part to two factors, lack of proper foam education and training, and inaccurate foam information that has circulated through the fire service. This is where the A-Foam Authority becomes a very important organisation for firefighters. An organisation has long been needed to address these issues and assist fire departments in determining how best to apply foam technology to their in their depart-



ment and their specific target hazards. Such an organisation, The A-Foam Authority, has now been established.

The concept of the A-Foam Authority was conceived several years ago by a group of Class A foam users and foam industry leaders. The organisation had a slow start moving in several directions and working with a couple of different organisations to determine how it would be structured. In May 2011 the decision was made that the organisation should incorporate as a non-profit corporation. That process was completed in October 2011 and the A-Foam Authority NFP was officially established.

The organisation has a governing board whose current officers are:

President: Keith Klassen, Waterous.

Vice President: Rick Fix, Fire Research.

Karen Reed: Board Secretary, Phos-Chek.

Treasurer: Al Kloha, Circle K Service.

Member at Large: Dominic Colletti, Hale.

Four standing committees have been established to distribute and organise the work of the organisation. The committees are: membership, education, technical and marketing. Each committee has a Chairperson and Co-chairperson.

The costs of the organisation to date have been covered by some of the major foam equipment manufacturers, including Waterous, who funded the start-up of the website, Darley who funded the incorporation, and Hale who has funded the marketing efforts. The industry participants will be key in the organisation moving forward. The current dues structure requires dues for corporate members, however fire department and individuals can join free of charge.

The purpose of the A-Foam Authority as stated in the bylaws is: "The organisation exists for the purpose of promoting education about the use of Class A foam for firefighting to emergency services professionals so they can better serve their customers and communities." To accomplish this purpose the technical committee is currently sort-

ing through information and articles submitted to them and will post only correct and accurate information on its website. This ensures that any information provided to organisation members will be accurate and useful.

The Education committee is currently working to establish base standards for Class A foam classes and training programs. Members can then be assured that any training endorsed by the A-Foam Authority will provide the appropriate information. The committee will also organise and provide foam training resources to its members.

Planning has begun to provide Class A foam symposiums in various locations that will provide classroom education and hands-on training. Along with providing education to firefighters we are working to identify opportunities to educate the leaders of emergency services, industry associations, communities, and insurance agencies on the benefits of Class A foam technology. The Marketing committee has begun promoting the organisation and informing firefighters of the services provided. The membership is actively recruiting new members, both fire department end users and industry manufacturers.

The membership numbers are growing daily. We would like to encourage any fire department or individual firefighter who is currently using Class A foam, is considering using foam, or would just like to learn about the technology to join the organisation. Membership to individuals is free and there is much the organisation can provide. We would also like to encourage all manufacturers of foam equipment and concentrates to join and help us build and strengthen the organisation. Your input is both needed and valued. We are also looking for people interested in participating on the standing committees. The more participation we have from the fire service the better we will be able to understand and meet the needs of the members. The Authority's President, Keith Klassen can be contacted on klassen@infomagic.net. **IFF**

Keith Klassen is President of A-Foam Authority

For further information, go to www.afoam.org

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While it is the monster-looking, stainless-steel encrusted firefighting appliances that are undoubtedly the most spectacular and awe inspiring, they are not necessarily the most cost effective solution for every firefighting role. With global brigade budgets and – in some instances – even manning levels being slid under the number-cruncher's microscope, many are now looking at vehicle options that can respond faster to some incidents at a lower cost, and with greater resource efficiency.

Among the best known names when it comes to small firefighting vehicles is undoubtedly Rosenbauer. Its SRV (Small Rescue Vehicle) range has been developed to enable first response and rapid intervention firefighting in a variety of areas including wild land, aviation and mining firefighting. The company's SRVs offer manoeuvrability on-road and off-road across extreme terrains, and carry powerful mobile extinguishing technology including ultra-high pressure systems (UHPS) and compressed air foams systems (CAFS).

The development of this type of vehicle has undoubtedly been driven by the need for speed and mobility; to get to the scene of the fire in the shortest possible time, and not be hindered in this endeavour by size or access limitations. This takes on a greater significance when the congestion in some of the world's older and more densely crowded cities is taken into account. The reality is that, in some dense urban areas, getting a small vehicle to the scene is about the only option to otherwise allowing the fire to engulf an entire district.

So, the availability and sophistication of such vehicles has now undoubtedly brought about a major re-think in fire and rescue services around the world; a process undoubtedly accelerated by the need for fire and rescue services everywhere to become as cost effective as possible.

Take, for example, the two additional specialist Small Fires Vehicles (SFV) that have recently gone into service at Hampshire Fire and Rescue Service in the UK. These vehicles, which are in addition to the existing fleet of firefighting vehicles, are on-call 24 hours a day to respond to small fires and antisocial fire-related incidents, across the 200,000-plus population city of Portsmouth and the 100,000 or so population town of Basingstoke.

So now, in response to appropriate incidents, this means that the county's fire and rescue service's front-line fire appliances will no longer be tied up attending non-critical small fires such as small grass, bin and rubbish fires, freeing them up to be available to attend life-risking incidents such as house or property fires. The mobilisation of

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these new units to small fires also means that the training and community safety activities carried out by crews on the traditional fire appliances are far less likely to be disrupted. The vehicles can also be used to carry out patrols to act as a deterrent in areas where there is a known arson risk. They can also be relocated to other station grounds for specific shifts, for example if an arson issue has been identified in an area close to the fire station, resulting in a quicker response time to this area of known risk.

Each small fire vehicle's crew consists of one crew manager and one firefighter, with the option of a community safety liaison officer bringing the crew up to three personnel. As well as being sent to deal with small non-critical fires, the crew will also participate in community engagement activities.

Hampshire Fire and Rescue Service's Area Manager, Andy Bowers, says: "The main benefits of having dedicated units such as this are that they enable an appropriate choice of vehicle in relation to the size of the incident be despatched and also allows our main front line fire appliances to attend large scale incidents where the risk to life is greater. These vehicles also provide a mobile facility to enable the crews to carry out preventative work and engage with their local communities."

The equipment carried includes two breathing apparatus sets, a high pressure fog/foam fire suppression system, a light portable pump and 800 litres of water. The appliance also carries various forcible entry/intervention tools that include a





portable electric saw, sledgehammer, folding short ladder and various small tools. The appliance is fitted with both a fixed 'main scheme' Airwave radio and a handheld version for remote operation away from the appliance. It also carries two fire ground radios and has been fitted with a GPS satellite navigation system for incident/address locating.

The demand for SRV and SFV vehicles (they are also sometimes known as MERVs or mini emergency response vehicles, or EUVs – emergency utility vehicles) that provide a fast and efficient response that is appropriate to the particular fire, is also found in specific fire risk environments as diverse as motor racing, and manufacturing.

Motor racing venues, for example, exemplify the difficulties of providing fire protection across large, complex sites. Typically, racing circuits comprise of a mixture of vast, sweeping open spaces alongside tight, confined areas such as the pit lanes and garages; environments where a combination of flammable materials, fuel and power sources can easily lead to a fire breaking out. In such highly charged environments, these smaller fast-reaction vehicles carrying a limited amount of suppression agent offer speed, mobility and the ability to access tighter spaces. They can be utilised to completely extinguish a fire, or at least contain it until heavier and slower front-line firefighting vehicles arrive to complete the extinguishing.

Such has the increase been in these "small end" firefighting vehicles that the manufacturers



of portable and mobile firefighting equipment have been quick to promote solutions that utilise utility vehicles, trucks and even motor cycles.

One such solution being put forward by Germany-based Advanced Firefighting Technology (AFT) is the use of open top pick-up trucks that the company says are ideal for carrying its portable, modular firefighting units. An advantage being put forward for this solution is that the units themselves can carry foam agents to develop foam mist, an extremely effective way to suppress petrol fires by blanketing and cooling the flames with a fine cleansing mist solution.

These AFT modular units can carry enough extinguishing agent – approximately 200 litres of water mist/25 litres of foam mist – to deal with larger fires and need to be no more than 1.5 metres wide, taking up significantly less space than large fire trucks. This means that there is the potential to deploy a greater number of these smaller units to deal quickly with the fire or contain it. An alternative to pick-up trucks is the enclosed type of vehicle, similar to those operated by Hampshire Fire and Rescue Service.

Another option being championed by AFT is transporting mobile water mist backpack units via motorcycles. These motorbikes must be optimised to carry fire extinguishers securely, but this simply involves fitting a tray to the rear behind the rider's seat and fitting a backpack that is strapped or clipped in to it. Upon reaching a fire, the firefighter needs only to unclip the equipment and can engage the fire straight away.

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Pete Dennett

Petrofac Training
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Offshore Training – Setting the Standards

Those working within the offshore energy industry ply their trade in some of the harshest working environments on the planet. The isolated nature of working on-board an offshore platform brings a multitude of challenges, as well as a number of potential risks.

While most of us would rely on the emergency services to come to our aid in the event of an industrial accident, such as a fire or chemical incident, those working in remote oilfields are not afforded the same luxury. Should an incident occur at an onshore facility or an offshore platform, the initial response is critical.

The energy sector is committed to ensuring the working environment is as safe as possible for all involved, but strong safety records are permeated

Minimising Risk

The safety of offshore operations, or indeed working in any hazardous environment, is at the forefront of industry thinking and planning. Vast budgets are devoted to ensuring that the safety processes in place are as robust as possible. Helping the oil and gas sector strive for its goal of zero incidents, means developing intensive training programs and strict procedures is critical to maintaining and building on the industry's safety record.

All of those on board an offshore installation or processing plant are required to undergo a rigorous training program to embed the knowledge, skills and ability to operate safely and effectively.

with incidents – the majority of which are successfully contained and managed – that reaffirm the need to prepare and invest in quality training and preparation. As a result, while all offshore workers must undergo a basic survival-training course, others inevitably take on greater responsibilities. In such an isolated environment it is critical that among those on board each platform are teams of highly skilled individuals ready to respond to avert any impending risk to people and the environment.

As a result, specially trained emergency response teams carry a great responsibility. They are the first line of defence for all of those on board an offshore installation, or processing plant and as such, are required to undergo a rigorous training program to embed the knowledge, skills and ability to operate safely and effectively. The majority of those selected to train and assume roles within offshore emergency response teams will never be faced with a serious offshore incident.



However, the requirement to ensure teams of trained individuals are available to respond should the need arise will never diminish.

Stark Reminders

The industry is extremely protective of its safety record and works hard to ensure it is as strong as possible through a process of continually revising of its regulations and processes. The North Sea, in particular, has built a reputation as a world leader in the standards and regulations it has put in place in the aftermath of the Piper Alpha disaster almost 25 years ago, which cost the lives of 167 men.

controlled environment. The concept for the centre was called for and supported by the industry's desire to set new standards in the safety of offshore operations.

Of course, replicating offshore conditions is challenging. Among the facilities at this site are a three-storey training module used to simulate gas and hydrocarbon firefighting techniques and prepare trainees for internal firefighting and rescue work, allowing delegates to experience the effects of heat, smoke and poor visibility, while also improving their teamwork and communications skills.

In the isolated offshore environment it is critical that among those on board each platform are teams of highly skilled individuals ready to respond to avert any impending risk to people and the environment.

The industry is also learning lessons from the explosion on-board the Deepwater Horizon in the Gulf of Mexico in 2010. Similar resolutions have been made as the industry strives to ensure that this could not and would not happen again. Such incidents continue to drive regulatory change and increased investment in the people on the frontline.

A Training Imperative

This has been recognised by the development of robust, industry-leading training from purpose built facilities worldwide.

For example, Petrofac Training Services' UK fire training centre in Montrose, Scotland was a world first for the oil and gas industry when it opened in 1978 with the aim of preparing predominantly offshore workers to achieve a level of real-life experience and competence in fire fighting, in a

A full-size helideck is used to simulate realistic scenarios such as a heavy landing, or low-impact crash with the helicopter on its side to enable delegates to practice emergency response and rescue. Another two-storey structure, known as the offshore installation module, provides delegates with experience of gas and hydrocarbon pressure fires and hydrocarbon spills. The specially designed module simulates fires from wellheads, flanges, ruptured pipe work and vessels.

A decommissioned accommodation block allows trainees to practice search and rescue operations that can be applied in offshore and onshore environments, as well as using breathing apparatus within formerly operational smoke-filled compartments. The facility is complete with functional helideck with refuel package that can be utilised for helicopter landing officer (HLO),

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helideck assistant (HDA) and helicopter refuelling training.

Training staff have been recruited from a wide variety of emergency response backgrounds and have an in-depth knowledge of the energy sector, both onshore and offshore. Courses are not only carried out at the training centre, but staff regularly make trips to offshore installations, including overseas locations, to conduct on-site training so that offshore and onshore personnel can benefit from expert advice tailored to suit the environment in which they work.

Last year, more than 56,000 delegates were trained globally across a variety of disciplines. These trainees undergo a variety of approved courses and training events, which include: Authorised Gas Tester Level 1, Basic H2S Training,

Breathing Apparatus Wearer, Confined Space Entry, Fire Extinguisher Training, Further Offshore Emergency Response Team Member/Leader, Night-time Firefighting, Further Offshore Response Combined Helideck and Team Member, Helicopter Landing Officer, Helicopter Refuelling, Helideck Assistant, Offshore Emergency Helideck Team Member, Offshore Emergency Response Team Leader and Offshore Emergency Response Team Member.

Its Integrated Emergency Response package allows an entire installation's emergency response team from Installation Manager and his Command Team to the Fire Team Leader and their fire teams to exercise together, enabling them to manage, control and direct their emergency response to an incident.

This type of innovative training approach utilises both the Major Emergency Management (MEM) simulators and the fire ground. The service also provides the opportunity to work alongside medical teams, allowing them to practice the management and treatment of casualties.

Endorsement by the industry regulators and bodies including: The Offshore Petroleum Industry Training Organisation (OPITO), Marine Coastguard Agency (MCA), and Joint Oil and Industry Fire Forum (JOIFF). Petrofac Training Services work closely with the industry to advise on current standards, future regulation and the required competency levels.

Most recently, Petrofac Training Services partnered with Raytheon to develop Hi-Con training. Based at NASA's Johnson Space Centre in Houston, Hi-Con delivers a unique level of survival training delivered from a world-renowned location by a team of experts that bring experience in high-consequence and immersive survival, safety and fire training.

Undertaking accredited training courses ensure minimum industry standards are maintained. However, while the principles of training are the same throughout the world. Training services provided to the global energy sector will have to continue to adapt and evolve in order to keep pace with a rapidly developing industry and the regulatory and legislative change that drives it. **IFF**



Pete Dennett is Fire and Well Services Manager at Petrofac Training Services

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Saturday, August 25, 2012 – Fire rises over the Amuay refinery near Punto Fijo, Venezuela. The huge explosion rocked Venezuela's largest oil refinery, killing 48 people and injuring dozens.



AP Photo/Ariana Cubillos

Years ahead of 2015: C6 AR-AFFF agents protect Amuay – and potentially the World.

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Chang Jho

Dynax Corporation

Flammability & Degradation of Fuel-contaminated Fluorine Free Foams

Fuel contamination is a serious issue with Class B firefighting foams. Also known as the fuel-pickup problem, fuel contamination is unavoidable because the foam comes in direct contact with the fuel.

Direct and forceful application of foam into the burning fuel creates more severe fuel contamination than gentle or indirect application. The fuel contamination problem can destabilise the foam and degrade it prematurely. More seriously, fuel contamination can make certain contaminated foams flammable thereby causing premature destruction of the foam blanket due to sustained burning, persistent edge flicker fires, flashovers and candle effects. These problems can seriously compromise the extinguishment and burn-back performance, resulting in an overall poorer firefighting performance of the foam.

Recognising this issue, international foam standards and specifications, such as Underwriters Laboratories UL 162 and European Norm EN 1568, have provisions, in qualifying foams, for both gentle and forceful applications. Gentle application requires a back-board to allow indirect discharge of foam onto the fuel. However, forceful foam application is more realistic of most fire situations, involving direct plunging and mixing of the foam into hydrocarbon fuel layers.

EN 1568-3 has an elaborate fire performance test to determine a class rating with a grid primarily based on the distinction between the forceful and gentle modes of application. EN 1568-3 even provides guidelines for bracketing foam concentrates. Only fluorosurfactant-containing foams such as AFFF, FFFP, AR-AFFF, AR-FFFP and FP are recommended for testing under the forceful application on hydrocarbon fuels, because the fluorosurfactants protect the foam and minimise this fuel pickup problem.

The International Civil Aviation Organization's (ICAO) standard Level B fire test and US Military specification (MIL-F-24385F), both of which only cover hydrocarbon fuels, require direct and forceful foam discharge onto the burning fuel in recognition of modern aircraft rescue and fire fighting (ARFF) techniques. Some manufacturers of F3 (Fluorine Free Foam) agents only recommend their products for fires that can be fought with gentle modes of application to minimise these fuel contamination issues. Because of the additional foam-destroying effects of polar solvent fuels, multi-purpose foam agents such as AR-AFFF and AR-FFFP are always tested and preferentially used with indirect (gentle) applications on polar solvents, but are widely used forcefully on hydrocarbon fuels.

Laboratory Foam Flammability and Foam Degradation Test – Dynax Method

Dynax research has developed a laboratory method for determining the effects of fuel contamination on the flammability and foam degradation of fuel-contaminated foams.

This test was used to evaluate several fire-fighting foams currently available on the market. Both F3 and fluorosurfactant-based, film-forming foams were tested and compared using this test procedure.

• Test Procedure

Test Fuels: Four test fuels were used: gasoline (unleaded 87 Octane from Shell), n-heptane (from Cole Palmer), cyclohexane (from Spectrum Chemicals) and Jet A (obtained from Westchester County, New York Airport Fuel Depot). The fuel was coloured with an oil soluble red dye (0.05% Lockwood Concentrated Red Oil Stain Powder #6331) to aid detection of fuel particle distribution in the foam. In separate testing the dyestuff was found not to have any effects on the test results.

Foam Flammability: Foam was generated in a blender (Hamilton Beach 7 Speed Blendmaster) using an appropriate premix solution (1%, 3% or 6%) in Poland Spring water. Eighty millilitres (mL) of the foam was added to a graduated cylinder containing 20 millilitres of the test fuel, and they were mixed by turning the cylinder upside down ten times by hand with a quarter turn rotation each time. Approximately 12 millilitres of the foam and fuel mixture was transferred to a glass Petri dish using a three-millilitre transfer pipet, and a gentle flame from a hand-held burner (Professional Cooking Torch by Bonjour) was passed over the foam without touching it to test its flammability.

Foam Degradation: In a separate set of tests, 80 millilitres of foam and 20 millilitres of fuel were mixed in a graduated cylinder the same way as in the flammability test. As soon as the foam and the fuel get mixed, a timer is turned on to measure the time taken for half of the initial volume of the fuel-contaminated foam to collapse (50% Foam Collapse Time). This foam



Table 1 – Comparison of Flammability of Fuel-contaminated Fluorine-free Foams and AFFF/AR-AFFF

Test Foam Agent	Flammability Of Fuel-contaminated Foam		
	Gasoline	N-heptane	Cyclohexane
Fluorine-free Foam Agents			
Product A-F3-6% Product B-F3-3%/6% Product C-F3-3% Product D-F3-3%/3% Product E-F3-3%/6%	All flashed and burned away	All flashed and burned away	All flashed and burned away
AFFF / AR-AFFF Agents			
Product 1-AFFF-3% Product 2-AR-AFFF-3%/3% Product 3-AR-AFFF-3%/3% Product 4-AR-AFFF-1%/3%	None flashed or burned	None flashed or burned	None flashed or burned

collapse time is a quantitative measure of the impact of fuel contamination on the stability of fuel-contaminated foam. For this test, only gasoline was used.

F3 Test Samples: The following products were purchased in the open market:

- Product A-F3-6%.
- Product B-F3-3%/6%.
- Product C-F3-3%.
- Product D-F3-3%/3%.
- Product E-F3-3%/6%.

AFFF/AR-AFFF Samples: These commercial film-forming foam agents were obtained directly from the manufacturers:

- Product 1-AFF-3%.
- Product 2-AR-AFF-3%/3%.
- Product 3-AR-AFF-3%/3%.
- Product 4-AR-AFF-1%/3%.

- **Results**

Foam Flammability: As the test results show in Table 1, all five F3 foams tested showed instant flash and sustained burning until the foam was completely destroyed. However, in stark contrast, none of the film-forming foams tested caught fire, so no burning at all was observed. This critical difference in the foam flammability between the fluorine-free and film-forming foams was observed with all the test fuels, except Jet A. The Jet A-contaminated foams did not catch fire with either F3 or film-forming foams simply because of its high flash point ($>38^{\circ}\text{C}$) and relative resistance to ignition.

Foam Degradation: All five F3 foams tested showed rapid degradation in the presence of gasoline. As shown in Table 2, the 50% Foam

Collapse Times for F3 foams ranged from 4.5 minutes to 9.5 minutes, whereas none of the film-forming foams showed any indication of foam volume decrease at ten minutes time when the test was terminated. Other fuels were not tested, but they are expected to have the similar foam-degrading effects.

Why Do Fluorine-Free Foams Become Flammable & Degraded When Contaminated With Fuel Whereas Film-Forming Foams Do Not?

1. Hydrocarbon surfactants attract fuel.

All firefighting foams including F3 foams contain fluorine-free surfactants used mainly as foaming agents: some are derived from natural products such as protein hydrolyzates, while many others are synthetic hydrocarbon surfactants. F3 foams generally contain very high levels of fluorine-free surfactants, especially hydrocarbon surfactants, to compensate for other missing ingredients.

Synthetic hydrocarbon surfactants contain hydrocarbon chains with varying lengths in their molecules. These hydrocarbon chains have inherent affinity to oil, a fundamental property known as oleophilicity or lipophilicity, literally meaning oil or fat loving. These hydrocarbon chains which constitute a major portion of the hydrocarbon surfactant molecules attract oil and therefore oil-based fuels, such as hydrocarbons. For example, n-octyl sulfate, a hydrocarbon surfactant commonly used in firefighting foam agents, contains a fuel-loving hydrocarbon chain, CH₃CH₂CH₂CH₂CH₂CH₂CH₂CH₂CH₂-(C8), and heptane, a test hydrocarbon fuel commonly representing Class B fires in many foam standards, contains the same, but different length hydrocarbon

Table 2 – Stability Test Results of Gasoline-contaminated Foams

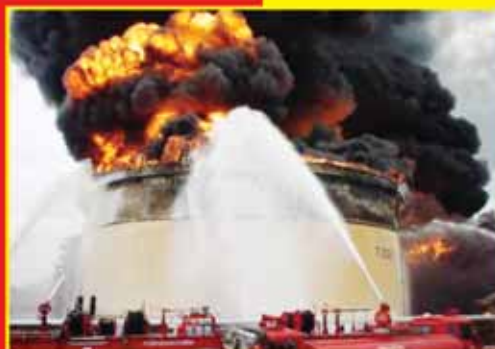
Test Foam Agent	50% Foam Collapse Time (Min.)
Fluorine-free Foam Agents	
Product A-F3-6%	4.6
Product B-F3-3%/6%	9.5
Product C-F3-3%	4.5
Product D-F3-3%/3%	5.5
Product E-F3-3%/6%	6.7
AFFF / AR-AFFF Agents	
Product 1-AFFF-3%	No collapse*
Product 2-AR-AFFF-3%/3%	No collapse
Product 3-AR-AFFF-3%/3%	No collapse
Product 4-AR-AFFF-1%/3%	No collapse

*Test for all AFFF/AR-AFFF samples were terminated at 10 minutes.



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chain, $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ (C7). The longer the length of the hydrocarbon chains, the more oil-loving they get.

F3 foams with very high levels of hydrocarbon surfactants thus have the inherent problem of attracting hydrocarbon fuels more strongly than fluorine-containing foams, especially film-forming ones. Natural protein foam (P), one of the oldest and most effective fluorine-free foams, despite its well-known, superior foam stability, still cannot be used in subsurface applications because of this fuel pick-up problem. For these applications, a small amount of fluorosurfactants is used most effectively in FP foams to prevent this fuel contamination problem.

2. Fluorosurfactants repel fuel.

Unlike the oleophilic (oil loving) hydrocarbon surfactants that attract fuel, fluorosurfactants contained in the film-forming foams are inherently oleophobic/lipophobic (oil/fat hating) and they repel fuel. Fluorosurfactants used in fire-fighting foams, such as AFFF, FP and FFFP, contain in their molecules a common chemical functionality that is responsible for the fuel repellency, a perfluorinated chain, $\text{CF}_3\text{CF}_2\text{CF}_2\text{CF}_2\text{CF}_2\text{CF}_2$ -(C6), which is a common backbone of C6-telomer-based fluorosurfactants currently used in film-forming foams.

These perfluorinated chains are also responsible for the fluorosurfactants' low surface tension and heat stability. These C6-telomer-based fluorosurfactants are recognised as safe for continued use, because they are not bioaccumulative and have very low toxicity profile. They are very different from the PFOS (C8)-based fluorosurfactants, which have been shown to be a PBT (Persistent, Bioaccumulative and Toxic) chemical, and are consequently now banned from use in fire-fighting foams in many countries.

When foam bubbles are generated from a firefighting foam solution containing both hydrocarbon surfactants and fluorosurfactants, both surfactants adsorb onto the foam bubble surface and help stabilise the foam. The fluorosurfactants, however, preferentially adsorb and align themselves on the bubble surface with the oleophobic fluorinated chains sticking out into the air due to their higher surface activity, a measure of their lower surface tension. This provides varying levels of fuel repellency and hence protection against fuel pickup into the foam blanket. In contrast, F3 foams without any such fluorosurfactant protection will pick up substantial amounts of hydrocarbon fuel, leading to significant problems of flashback, edge flicker fires and re-ignition during firefighting applications.

3. Hydrocarbon fuel can spread over the F3 foams, but cannot spread over the film-forming foams.

The development of AFFF in the early 60s was based on the discovery that the fluorosurfactants impart not only very low surface tensions to their aqueous foam solutions, but also fuel repellency and thermal stability against heat breakdown of the foam bubbles. It was also discovered that the low surface tension provided by the fluorosurfactants, when coupled with the low interfacial tension provided mainly by the hydrocarbon surfactants, makes it possible for the aqueous foam solutions to spread spontaneously and form an aqueous film on the fuel surface (the spreadability of foam solution over the fuel).

This aqueous film formation and its role in the firefighting effectiveness of AFFF foams for Class B fires is well known and generally understood: it provides a fuel vapour barrier that helps achieve rapid extinguishment and improved burn-back per-

formance. However, the reverse case, in other words, the spreadability of fuel over the foam and its role is not well understood despite its direct, detrimental effects on the flammability of F3 foams when contaminated with fuel.

4. Spreadability of fuel over the F3 foams is causing their flammability and degradation when contaminated with fuel.

We found that the relative spreading tendencies (spreadabilities) of the fuel over the surface of the foam solution, or vice versa, was a key factor that determined the distinctive difference between the flammability of fuel contaminated F3 and film-forming foams.

Spreadability of one liquid over the surface of another liquid is a measure of mutual repellency between the two liquids. For example, all the premix solutions of film-forming foam agents tested showed spontaneous spreading tendencies on all the test fuels, whereas none of the premix solutions of F3 agents showed spreading on any of the test fuels. More importantly, all test fuels showed spontaneous spreading on all of the F3 premix solutions, but none of them showed spreading on any of the premix solutions of film-forming foam agents.

This spontaneous spreading of the fuel over the F3 premix solutions was found to be a direct cause of the flammability and degradation of the fuel-contaminated F3 foams. In the case of the fuel-contaminated film-forming foams, the fuel particles remain literally trapped and wrapped around by the foam solution contained in the foam bubbles, much akin to the oil drops in an oil-in-water emulsion, and therefore the fuel particles are not exposed to air for burning in the presence of an ignition source.

The detrimental effect of fuel contamination on the stability of the contaminated F3 foams is due to the spreadability of the fuel over the foam bubbles. The spreading fuel over the bubble surface destabilizes the foam bubbles, which leads to their collapse.

In this paper, only the foam flammability and degradation data are presented and discussed. A follow-up paper containing more detailed analyses of the aforementioned relative spreadability data in relation to the flammability and degradation of fuel-contaminated foams will be presented in a science/technical journal.

Conclusions

The reproducible fuel-contamination simulation tests carried out in these laboratory experiments represent an extreme case of a fuel pick-up or contamination situation. However, it is clearly demonstrated that the flammability and degradation of fuel-contaminated F3 foams are both fundamental problems. These problems are caused by the presence of large amounts of the inherently fuel-attractive hydrocarbon surfactants and the absence of fuel-repellent fluorosurfactants in the F3 foam and their high surface tensions relative to those of the hydrocarbon fuels.

When compared with the film-forming foams, this fundamental foam flammability problem with F3 foams can be more detrimental to their overall performance than their lack of film formation in fighting hydrocarbon fires. This foam flammability issue can severely limit the range of applications for F3 foams, suggesting only gentle applications of an aspirated foam are appropriate to avoid the foam-destroying and flammability-causing effects of these fuel contamination problems, when more forceful application is usually desirable.

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Chang Jho is Vice President of R & D at Dynax Corporation

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CBRN: Ensuring the



Steven Pike

Argon Electronics

In the past, training firefighters for chemical, biological, radiological and nuclear (CBRN) incidents was relatively straightforward. Today, however, the task is far more complicated. The emergency services are faced with many different challenges and no two incidents are ever the same. This is largely due to the fact that, in recent years, the range of potential incidents has increased considerably, spanning from the dangers of entering meths labs to dealing with the threat of terrorist attacks, especially involving devices such as so-called dirty bombs.

There are many challenges to meet in training first responders to deal with CBRN incidents and, to provide the best service, it is necessary to consider some of the advanced technology now available – in particular, simulation instruments and software – to specify, equip and plan for the most appropriate training techniques. First responder organisations can then ensure that personnel are adequately trained to deal safely and effectively with CBRN threats.

Simulation equipment is now playing a vital role in improving the quality and consistency of training and that role can only become more vital as budgets are tightened and governments are looking for the most efficient and effective options. In Europe, for example, government spending has declined substantially as a result of the financial crisis. With reductions in transnational civil defence spending and resultant changes to organisational structures, the efficiency of simulation training is now more valuable than ever.

Traditionally, CBRN response training has involved trainees carrying real detection instruments, searching for small quantities of simulants and even, in the case of training for nuclear hazards, responding to hand-written signs showing the level of radiation present at a given

location. These methods have of course been useful in training responders to deal with CBRN threats but compared to the options available today, they are unsatisfactory.

For example, using real detectors in training temporarily takes equipment out of service. Worse still, it poses the risk of it being damaged and decommissioned for a far longer time while it is repaired, recalibrated or replaced. There are also personal risks to trainees during exercises that involve simulants of hazardous substances, since even small quantities of this material can pose a real health hazard. As for using hand-written signs as indicators of contamination, this is of limited benefit since it does not allow trainees to develop any understanding of how to handle and use detection instruments or how to interpret the readings they provide. In contrast, the use of simulation equipment has recently provided a much-needed upgrade to CBRN response training and is currently enabling the delivery of a highly efficient, flexible and cost-effective service.

This upgrade is particularly welcome when we consider the range of threats now facing first responders. Take, for example, the rise of methamphetamine laboratories, which put both the public

Right Response

at large and responders themselves at risk. The need to flush out these labs is urgent; in addition to the risk of explosion, there is a serious and constant threat posed to the environment and local residents by the chemical contamination from the hazardous waste of these labs.

Chemical reactions that occur during the manufacture of meth are so toxic that they can produce hazardous vapours that can permeate walls, carpet, plaster and even the wooden structure of the building. Hazardous events at meth labs are on the rise and few of those arrested for manufacturing meth are trained chemists. This adds to the danger because these “cooks”, who have little or no chemical training and learn their formulas from other cooks on the Internet, are playing with chemicals that are highly corrosive or flammable.

Some chemicals will react with each other – or even water – to cause a fire or explosion, or emit vapours that attack mucous membranes, skin, eyes, and respiratory tract. With so many challenges to face, there is an urgent need for responders to be thoroughly prepared and be clear and confident about how to operate their equipment, enabling them to concentrate their efforts on the specific threat in hand.

Using programmable electronic sources, simulation training systems are capable of simulating a wide range of threats. In each case, the exact functionality, look and feel of real life in-service equipment is replicated, making it easy for trainees to transfer their knowledge from the training centre to the field of operations.

The ease with which these simulations can be set up significantly increases the efficiency and flexibility of training exercises, allowing instructors to simulate a wide range of realistic scenarios. In the UK, Argon Electronics supply the nation's emergency responders and armed forces with simulation equipment that enables them to regularly run training courses that include very realistic exercises. By delivering the highest possible standards of training to their students these organisations ensure that personnel can return to



by pausing or fast forwarding the exercise to suit the precise progress and status of the exercise participants. While a real event would not allow this opportunity, the potential to pause the exercise is valuable in training that may be designed to evaluate, test or validate, and allows the students to get the most out of the day's experience.

The software uses Windows-based software to allow multiple trainees to be managed and monitored from a computer at a central location within the exercise area. Typically, a training exercise scenario is setup using a built-in mapping system or locally drawn plans, onto which a plume or hotspot is defined. This can be based on variety of specific substances, CW agents, radionuclides or compounds, and be configured to reflect different release characteristics including duration, direction, persistence and deposition.

Modern training simulation systems now play a key role in helping the emergency services improve response times, the safety of their personnel and the public, and their ability to combat a wide and varied range of CBRN incidents.

their units with the knowledge and skills to deal effectively with specific threats and to meet the changing needs of contingency operations.

Argon Electronics also provides simulation equipment to responders across the globe for local exercises. For example, an exercise based on the radioactive output of a fictitious nuclear power station recently took place in the USA using PlumeSIM software. The capability of PlumeSIM to trigger readings and alarms on the simulation tools carried by response trainees brought a valuable flexibility to the exercise. It allowed the exercise controller to manage the staging of the simulation

In the classroom, the system allows trainees to navigate a virtual world using gamepad controllers, while simulators indicate readings and alarm accordingly. In the field, trainees are equipped with a portable GPS-equipped device, which automatically receives instructions from the central control computer; the portable device then relays the simulated readings to the simulators carried by the student, which in turn provides an indication of the simulated threat that is present. This system allows the movement of trainees, along with monitoring errors and initiating simulated readings and alarms to be tracked and monitored in



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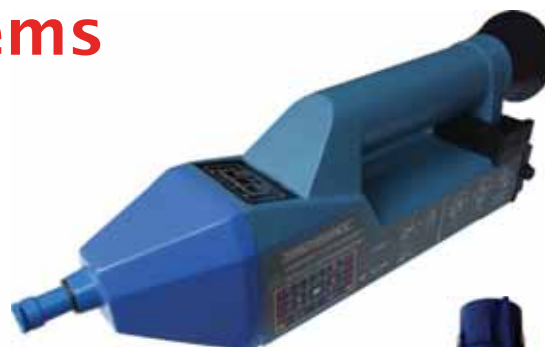
real time. All data is recorded and can be analysed after the field exercise, providing individual trainees with detailed feedback on their performance.

An entirely different but equally challenging simulation exercise to the one mentioned above recently took place in the UK. In what was understood to be the first UK event of its kind on such a scale, Argon Electronics provided the Lancashire Fire Service with the capability to safely simulate the release of a radiological hazard. The scenario involved the simulated crash of an aircraft following a terrorist hijack, and the release of a radioactive material at the site.

Firefighters were greeted by the tail section of an aircraft that had crushed a car with passengers inside. Billowing black smoke led on to the main body of the aircraft, realistically manned by 'injured' volunteers who had previously been



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'contaminated' with safe simulant materials. Other simulation sources were strategically located in the wreckage. Equipped with Argon simulators in place of the real detectors, personnel were able to realistically carry out their roles without risk of harm or damage to themselves, other participants, their equipment or the environment.

Such is the effectiveness of simulation tools and software that they are now a regular feature of response exercises designed not only as training but as showcases and knowledge-sharing events that aim to promote best practice. For example, one of the aims of RECCEX 12, the major Nordic CBRN Reconnaissance Exercise, which took place in Sweden during August 2012, was to develop and exchange the latest and best methods of responding to CBRN threats. The use of Argon's simulation tools, which were upgraded in

preparation for the exercise, enabled the participants to experience first-hand the benefits of today's state-of-the-art equipment. Argon provided over 50 simulators for the exercise. Several chemical reconnaissance exercises were carried out by the platoons, who were tasked with identifying and recording the location of simulated release chemicals, enabling spectators and participants to appreciate first-hand how the operational flexibility of modern simulation equipment enhances the capability to counter CBRN incidents.

Exercises such as these have enabled some specific problems to be identified and addressed long before a real life emergency. These have included problems of reading detection instrument displays accurately in bright sunlight, the difficulty of clearly communicating readings back to a command and control centre while wearing protective clothing, and the confusion that can arise if several personnel are using different detectors, each of which has been calibrated to output readings using different measurement scales.

Modern training simulation systems now play a key role in helping the emergency services improve response times, the safety of their personnel and the public, and their ability to combat a wide and varied range of CBRN incidents. Despite these economically challenging times, it is clear that governments worldwide are placing a high degree of importance on CBRN training. Simulation equipment enables first responder organisations to ensure that personnel are adequately trained to deal effectively with CBRN threats.

IFF

Steven Pike is managing
Director of Argon Electronics

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Disaster's Unpredictability



Peter Schellekens

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In most earthquake disasters deaths and injury are primarily related to collapsed building. The growing population and ingenuity of mankind is creating bigger and higher buildings to house more and more people. When an earthquake strikes in the larger metropolitan areas it will definitely result in a tremendous disaster and the devastation will be unknown. But it is not only earthquakes or weather-based phenomena we must fear.

Think of the possibility of a terroristic attack, or a truck that hits a building. Even the number of spontaneous collapsed buildings due to bad structures should never be underestimated. In today's world, we must accept the fact that when a disaster of any kind strikes, more people will be trapped under collapsed buildings.

Be Prepared for the Unexpected













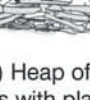
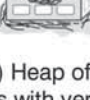
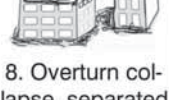

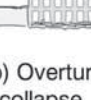

Many reports show that in the aftermath of such disasters, the situation prevailing at the scene is unknown. Worse, at these events, where fast and efficient search and rescue equipment minimises the number of losses in human lives, it appears such equipment is scarce, if available at all. Not only specialised groups, such as USAR teams, but also firefighters should be trained to save people from collapsed buildings. To do this they must have access to sufficient rescue equipment if they are to perform adequately in such situations. It is national governments that should take a leading role in making such equipment available in the necessary quantities.

What is Structural Collapsed Building Rescue?

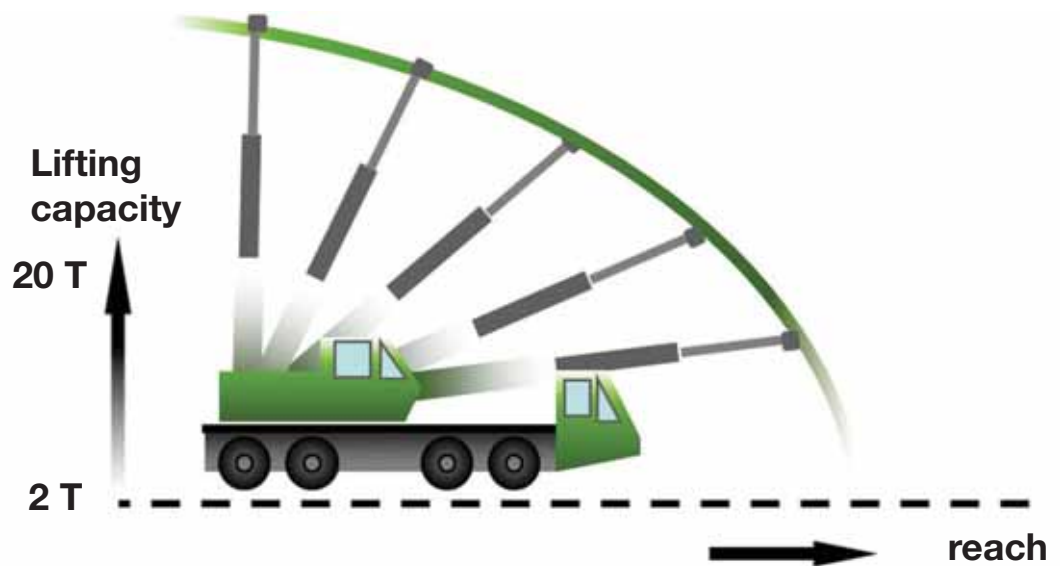
Digging a bit further, the following ten types of collapsed buildings were found.

- 1 Inclined plane
- 2 Multi-layer collapse
- 3 Outspread multi-layer collapse
- 4 Pancake collapse of one storey
- 5 Pancake collapse of more than one storey
- 6 Heap of debris on uncollapsed storeys
- 7 Heap of debris
- 8 Overturn collapse, separated
- 9 Inclination
- 10 Overhanging elements

For sure, structural collapsed building rescue is a complex operation and may even lead to confusing situations; it demands skilled rescuers and specialised equipment, the latter generally not being part of the standard rescue equipment (or could it be part of it?). It requires advanced knowledge of building structures and materials and a variety of technical rescue skills.

 1. Inclined plane	 2. Multi layer collapse	 3. Outspread multi layer collapse	 4 a) Pancake collapse, first floor	 4b) Pancake collapse, intermediate story	 4c) Pancake collapse, upper story
 5. Pancake collapse, all stories	 5a) Pancake collapse, several lower stories	 5b) Pancake collapse, intermediate stories	 5c) Pancake collapse, upper stories	 6. Heap of debris on uncollapsed stories	 7a) Heap of debris
 7b) Heap of debris with planes	 7c) Heap of debris with vertical elements	 8. Overturn collapse, separated	 9a) Inclination	 9b) Overturn collapse	 10. Overhanging elements

STRUCTURAL COLLAPSE RESCUE



Who is First to Help?

Without doubt, the first to help are usually the survivors of the disaster. However, it is likely they lack sufficient knowledge and experience of doing rescue work. Sometimes they are the only hope for victims to survive a disaster, but often they end up making injuries worse. Next comes the group of people that has witnessed the event. Also for this group the danger lies in the fact they have insufficient knowledge in how to rescue trapped victims. They may even be at the scene for the wrong reasons, for example, driven by their curiosity.

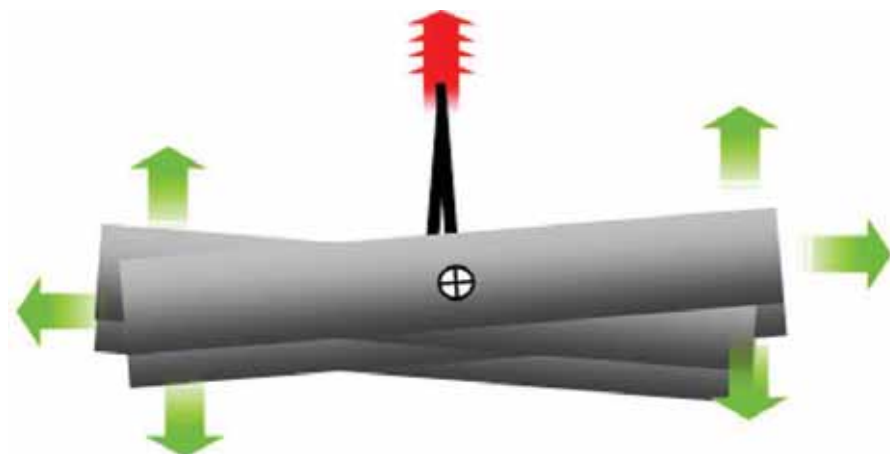
It takes time for rescue teams, police, fire-fighters or even USAR or INSARAG teams, to arrive at the scene. The sooner they arrive, the bigger the chance of survivors. There is only little time for them to understand the situation, to make a plan, get the right equipment and start the rescue operation. Besides rescuing the victims, they have to perform the rescue operation in such a way that they will not be injured as well – a serious and responsible task.

Rescuers' Safety First

Before entering the scene, questions need to be answered first. Think of any hazards at the scene, such as fallen power lines, downed trees, chemicals that may have been released, the type of damage, the required resources, and so on. Only a rescuer who understands the situation will be able to act in a safe manner without putting his own safety at risk. Information will be needed on the building structure, the type of collapsed building, the possible presence of hazardous materials, and the possible number of people in the building. Obtain that information first before planning which rescue steps to take. Think!

Possible Rescue Operations

Structural collapse rescue always starts with the search for victims. There are various search devices to help locating victims, such as search cameras. However, rescue dogs and rescuers have proven to be very effective. Once victims (but also casualties) have been located, the following rescue operations have been defined:



Lifting straight up creates an unstable floating load

- 1 Injured but not trapped: Also known as the surface victims. Usually caused by falling debris or the victim falling on to the ground.
- 2 Non-structural entrapment: Victims are trapped by, for example, book shelves, a cupboard or small pieces of debris. In such cases the building is still in the original shape, but may have been damaged.
- 3 Void space non-structural entrapment: In these cases we are dealing with a partial or complete collapsed building that is a dangerous environment for both the trapped victim and the rescuer. Victims can be trapped by office furniture, but in void spaces. In this case securing the area is mandatory to avoid further collapsing.
- 4 Entombed: Unlike void space non-structural entrapment, the victim is now trapped under heavy structures such as walls, floors and roofs. This is a very hazardous situation. It will be essential to secure, lift, remove or even breach the structural components for the victim and the rescuer to move to a safe location.

Before entering the scene, think of any hazards at the scene such as fallen power lines, downed trees, chemicals that may have been released, the type of damage, the required resources, and so on.

This takes six simple steps:

- 1 Think
- 2 Stabilize and block
- 3 Lift
- 4 Follow the load
- 5 Secure
- 6 Extricate

These simple steps must definitely be memorized in order to move the entrapped victim safely without putting the rescuer's own safety at stake. However, memorising these six steps will not be enough. The right equipment is needed in the proper quantity. Ideally, there should be access to equipment that, with the aid of "add-ons" can be used for a variety of tasks. Tools should offer full integration and be able to communicate with one another. Think of an example such as lifting bags supported by struts securing the environment for both the victim and the rescuer.

Stabilisation and Block

Where rescue manufacturers offer cribbing blocks wood is often used for cribbing. Unlike wood, cribbing blocks are intelligent, lightweight, easy to carry and offer a high load capacity. They can be easily connected to each other, enabling different stabilisation structures to be created. And



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STRUCTURAL COLLAPSE RESCUE



Small insertion height

yet, it is not a compulsory part of the rescue equipment.

Another important thing to note is that during structural collapse rescue, it is not permissible to use hydraulic equipment. The forces generated by hydraulic rescue equipment are strong and might cause another collapse at a different point. Securing the environment is therefore always done by mechanic stabilisation. However, you may find your current equipment does not include a mechanic shoring device.

During structural collapse rescue, it is not permissible to use hydraulic equipment as the forces generated by hydraulic equipment might cause another collapse at a different point.

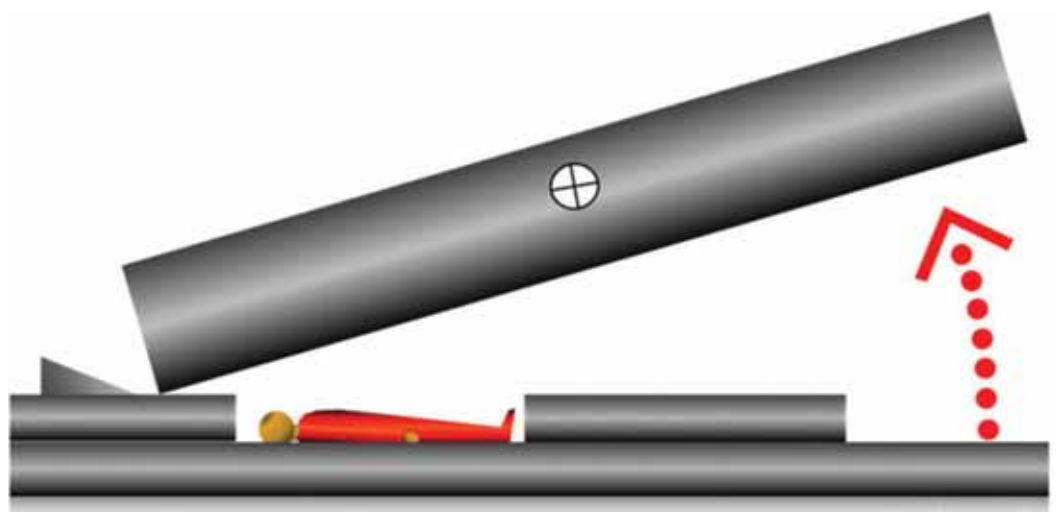
Follow the Load

Follow the load, better known as the ARC movement, is not included in most guidelines or training modules, but it is a highly underestimated risk while lifting. It is common knowledge that structural collapse rescue is a process of vertical movement rather than horizontal movement. A first thought might be to get a crane to the scene

and have the debris lifted straight up, but often it is impossible to get a crane even close to the site of the rescue. Another downside is that the lifting capacity of a crane decreases when it needs to make a longer reach. Simultaneously, lifting straight up creates an unstable floating load. In the worst case scenario, the crane may fall over. So, cranes may not be suitable for rescue operations, but they are very suitable for recovery operations after all victims have been rescued.

To get close to a trapped victim, airbags for lifting and shoring devices to secure the entrance from further collapsing are used. But, shoring devices do a lot more; they create a safe and stable condition for you and the victim.

A third of all collapsed building victims rescued are found in void spaces; spaces created by the way materials fall. These void spaces are, in general, very small. For that reason there will be a need to lift at maximum height to create just a small opening. When lifting, a pivot point is created; a vertical movement of debris will normally further collapse the sides of the void spaces protecting the trapped victim. Unless the structure to be lifted is secured by cribbing blocks and shoring devices following the load, the structure will start moving in an uncontrolled manner and in an undesirable direction. This might result in casualties that could have been rescued. The lifting bags must also be able to create such heights. Moreover, they must follow the ARC movement as well. If not, they might simply shoot out. Unless the conditions are stable and secured, it is impossible to get close to the victim for extrication.



Maximum height is required to create only a small opening

Sturdy or Smart?

Rescue operations, especially structural collapse rescue, are dangerous and involve long hours. So no doubt, a rescuer is sturdy. Even the rescue equipment that is being used is sturdy and heavy. But shouldn't rescue equipment be developed in such that you can operate it safely, perhaps even remotely? Ideally rescue equipment, especially heavy rescue equipment, supports the rescue task without causing stress and strains to the rescuer's body. Each piece must integrate with other pieces and offer unlimited applications so it is possible to create a tool that provides the best solution in any particular situation. It is still though surprising to see so many different shoring devices – each separately used in a different circumstance. The fact is that the different applications, secure, shore, trench, and so on, have already been integrated into one multifunctional shoring device that can operate both hydraulic and mechanically. No wonder that research shows that the lack of availability of the right equipment plays an important role in the success rate of structural collapse rescue.

Rescue equipment should not cause stress and strains to the rescuer's body. Each piece must integrate with other pieces and offer unlimited applications so that it is possible to create a tool that provides the best solution in any particular situation.

A Country's Responsibility?

Of course, most countries are well prepared and have USAR teams or something similar lined up in case a disaster strikes. Local fire departments are generally well equipped with rescue tools, but are neither trained for, nor do they have sufficient equipment in place when it comes to rescue operations involving collapsed buildings, HazMat incidents or even large road traffic accidents. Only when national governments implement standardised guidelines, create a plan that includes strategically situated sets of specialised heavy rescue equipment, rescue sets that can be mobilised to the scene within limited time, then we can say we are fully prepared. Yet, it is the unexpected that makes rescue a real challenge; and it is the availability of the right skills and the proper amount of specialised equipment that makes a rescue a real success.

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Peter Schellekens is a Field Engineer at RESQTEC

For further information, go to www.resqtec.com

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Graham Collins

The Power to Perform

New and improved hydraulic extrication and rescue tools and new techniques are continuing to change the speed, efficiency and safety in which rescue operations are being carried out. Here we take a look at some of the latest thinking and unveilings from the world's leading manufacturers.

New Technology Challenges

In a recent Product Profile in our sister magazine, Asia Pacific Fire, HOLMATRO set out the challenges being faced by hydraulic extrication and rescue tool manufacturers and the steps they were taking to overcome them.

In the Profile, the company emphasised the point that advances in new car technology over the past twenty years have had a huge impact on how we think about rescue. We all acknowledge that vehicles are much stronger, have wider profiles and react differently both during the collision and the extrication process. However, rescuers themselves, and the tools they use, have advanced at an even greater pace. An amazing achievement for rescuers, when considering that training on new vehicles is nearly impossible.

Equipment has been developed with new car technology in mind, and Holmatro has tools specifically designed to operate on the latest vehicles, both in terms of overcoming increased strength and larger profile construction. This ability to get through the latest strength with wider blade opening capacity means that the number of cuts on scene is reduced, making extrication quicker.

Cutters and spreaders that are light and ergonomic lighten the physical burden on rescuers. These smaller, lightweight tools are easier to control, of course improving the safety of the handler. Rams that manually extend before they use hydraulic force mean that physical entrapment can be removed far quicker.

Manufacturers are committed to reducing time on scene, which is why we now have single hoses and couplings that can be changed under flow with one hand in



Rescuers are today encountering vehicles that incorporate materials that may defy older-generation hydraulic cutters. Teams that are not prepared to cut or work around advanced steel may not be able to extricate injured patients in time to save their lives.

the standing position, again reducing the impact on rescuers. These single hose systems are quicker to deploy, easier to manage on scene, and far quicker to make up and restore on the vehicle, making the scene a safer environment.

Hydraulic pumps advances now see three-stage units delivering more oil at

critical pressures, allowing more tool speed. They are also casualty friendly due to very low noise output; this allows casualty assessment to go on, uninterrupted throughout the space creation phase of the rescue.

For more information, go to www.holmatro.com

ProFix Versatility



According to RESQTEC, the first step in vehicle extrication is stabilisation; you always have to prevent potential movement caused by the techniques and equipment used by rescuers. Key in vehicle stabilisation is to ensure the vehicle has as much contact as possible with the ground. You need to create contact points spread over a wide area so that optimum stability is created. Selecting those points is not easy as you do not want to block the access to your victim, but do need a stabilised vehicle.

However, stabilisation involves more. You have to consider the centre of gravity and the point at which all the weight of the vehicle is concentrated. The closer the vehicle's centre of gravity is to the ground the more stable it gets. An estimation of the vehicle's weight will tell you what force is required to move it.

While cribbing offers good stability when the vehicle is stuck on all four wheels, when the vehicle is on its side, on its roof or even crashed into a building, cribbing alone is no longer sufficient. Vehicle stabilisation kits are essential in such cases.

RESQTEC's ProFix Max is designed to be used in multiple stabilisation applications. It can be operated pneumatically, mechanically

and hydraulically with a maximum working pressure of 10bar and a capacity of 14 tons.

It is outfitted with a telescopic system, the benefit of which is that it automatically locks when an object starts moving or shifting, offering great safety to both the victim and the rescuer. Even when taking close care of the situation the rescuer should never underestimate the fact that objects still have the intention to shift unexpectedly. With the ProFix Max RESQTEC offers a stabilisation system that secures the load inch by inch. Manual tensioning is also possible with the adjustment collar. The ability to operate the ProFix Max with a remote control is another feature.

The automatic locking system enables the ProFix Max to be used for multiple applications, whether facing a situation in which a vehicle needs stabilisation, structural collapse needs securing, a wall requires support, trench, even stabilising a train, bus, truck or a tank. Its various accessories provide the right adapter for easy placement whatever the surface. Its extensions allow the length to be extended by another 150mm to 1.20 metres.

The ProFix Max's uniqueness lies in that it is fully integrated with the other tools offered by RESQTEC. Using the connector tool allows it to be connected to a ram. The PowerPlate provides a strong base for any ground surface, where the MultiSwivel allows the ProFix Max to be turned in any position. The ProFix Max part of RESQTEC's Octopus system.

For more information, go to www.resqtec.com

Rescue Tool Mobility

The P 600 OE from LUKAS makes hose-connected rescue tools mobile. It gives the maximum freedom of movement in every situation because it is small, light and easy to handle. It also enables location-independent use of a rescue tool in the optional battery mode.

Rescuers have the choice: operate the rescue tool with mains power or with a high-performance battery. The power unit has a unique energy management system that guarantees extremely long running times.

The P 600 OE is: patient-friendly, with no exhaust fumes and very quiet operation; it is small, weighs less than ten kilograms and is easy to use; offers almost unlimited radius of action; is ideal for traffic pile-ups or off-road; has an illuminated oil tank; and is suitable for one-man operation. It offers a low pressure – high pressure flow rate of 2.6 litres-a-minute to 0.5 litres-a-minute and measures just 480mm by 182mm by 257mm.

For more information, go to www.rescue.lukas.com



New V-Strut Provides Stability

The key to success is maintaining safety and reducing time on scene by using intelligent hydraulic and assist tools, specifically designed with the rescuer in mind. The importance of safe and rapid stability can never be over emphasised.

The new V-Strut from HOLMATRO provides stability in a wide range of scenarios to many types of vehicles in 15 seconds. This allows the medics to gain entry and stabilise the patient, thus allowing the technical rescue to begin sooner, and as we know, saving time saves lives.

The thinking behind the V-Strut from Holmatro is that stability is literally the foundation of any successful casualty-centred rescue. Preventing vehicle movement is vital as it prevents any further injury to the occupants, provides a solid base for medical intervention, and prevents any further structural deformation of the vehicle during the rescue process.

Once safety on scene is established, stability can begin. Entry into a vehicle should only be made once stability is completed (unless a casualty is at immediate risk, due to a compromised airway) and the process should be safe, rapid and easy, allowing casualty care to begin immediately. If the process of stability is delayed, safety is compromised, as is casualty care, and the technical rescue cannot progress. All of this adds to your on scene time and delays extrication.




Worldwide, statistics differ, but the majority of extrications are performed on vehicles that are still on their wheels where blocks and wedges are adequate. However, a proportion of vehicles will be on their roof or on their side following a collision and the mechanism of injury means that effective stabilisation is critical and additional equipment will be required. Often the final position of the vehicle may be off road, on uneven surfaces and on soft ground, so the equipment you choose must be able to cope with this type of environment.

The new Holmatro V-Strut makes stability of vehicles in such positions, safe, rapid and easy, meaning that casualty access can be gained as soon as possible. Its intelligent design means that the strut can be extended in a single action to precisely the required length (due to small intervals) and auto locks, saving time. Its serrated multipurpose head means that it 'bites' into the vehicle construction, with no need to find an edge to hold against. Its tilting foot means that the strut can be inserted at any angle, allowing use off road. Its design and construction means it is ergonomic, perfectly balanced and extremely light weight, all of which reduces the burden to the rescuer during use.

Its fully extended length of 1.8 metres and shoring capacity of 16kN means that it is suitable for use in a wide range of situations and on a wide variety of vehicles, including the ability to reduce movement to truck cabs that require stabilisation independently from the chassis.

For more information, go to www.holmatro.com



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Nick Lynd

Sembcorp Protection

“Fail To Prepare, Prepare To Fail”

Petrochemical and storage tank fires regularly illustrate the significant damage that can be caused to critical assets during an emergency. Post incident key learning in the majority of cases reveals the need to ‘be prepared’. As one of the founding fathers of the United States, Benjamin Franklin, put it: “Fail to prepare, prepare to fail”.

Having a state of permanent readiness requires the ability to respond operationally. For any industrial organisation, and particularly in the high-hazard petrochemicals sector, this not only has a resource impact but also requires significant financial commitment. Operational responders need to be competent and confident in dealing with all types of emergency situations. There is also the need to have the relevant ‘armoury’ to be able to tackle such potentials fast developing and high fire load incidents.

More and more, protecting these high-risk assets is being entrusted to experienced specialist emergency response organisations that offer comprehensive emergency management services tailored to the requirements of each particular business. Any company selected for this task should have at its disposal the latest firefighting technology designed specifically for high-hazard environments, including world-class firefighting appliances and bespoke industrial fire trucks. Such a company also needs to hold extensive stocks of foam concentrate and have appliances equipped with Hydro-Chem ability, allowing the application of a combined media of water/foam and powder, which is particularly effective in dealing with three dimensional fires.

The Critical First Few Minutes of Response

Critical Accountabilities

The Process Safety Leadership Group (PSLG), a joint industry and regulators group, was set up in 2007 in the UK to drive forward the high standards in process safety leadership and to complete the implementation of the Buncefield Major Incident Investigation Board’s recommendations. The Buncefield incident was a major fire caused by a series of explosions at the Hertfordshire Oil Storage Terminal in England; an oil storage facility owned by Total UK. It was the fifth largest oil-products storage depot in the United Kingdom, with a capacity of about 60,000,000 imperial gallons.

A PSLG report placed an obligation on COMAH (Control of Major Accident Hazards) establishments to comply with the recommendations, including Part 4 which covered engineering against loss of secondary and tertiary containment. This section, while recognising the priority that should be given to preventing loss of primary containment, demonstrated that adequate secondary and tertiary containment remains necessary for environmental protection and the safety of people. The inability to

contain fuel and fire water run-off at Buncefield contributed significantly to the failure to prevent a major accident to the environment.

Recommendation 17 (Part 4) of the report states: ‘Well planned and organised emergency response measures are likely to significantly reduce the potential duration and extent of fire scenarios, and so reduce firewater volumes requiring containment and management. Site specific planning should be undertaken and should include: “consideration of recommended fire water/foam additive rates and fire water flows and volumes at worst case credible scenarios.”

In addition, the PSLG Emergency Planning Guidance states that: “Scenario based incident specific emergency response plans can identify incident control resources required for fire and emergency response, while providing a tool to exercise against, closing the loop from preparation, to planned and exercised response.”

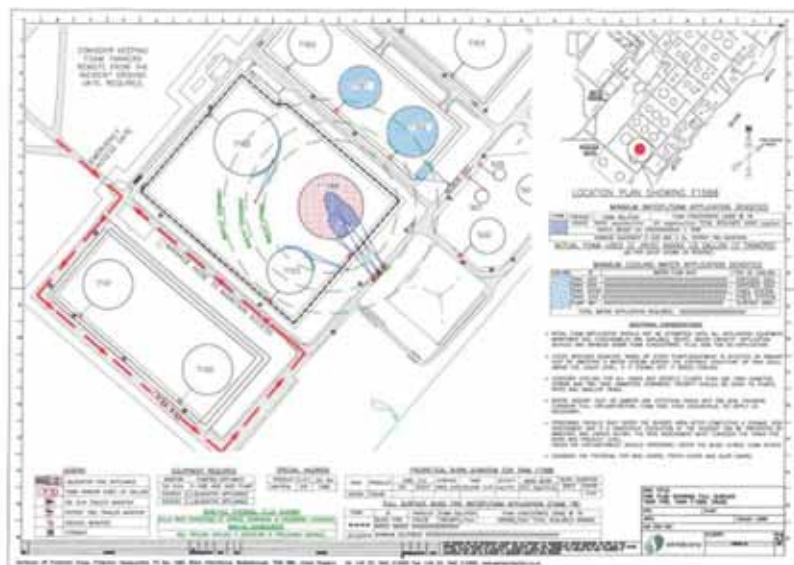
The ultimate aim is to protect people, property and the environment from the destructive effects of fire. The benefits of being prepared for such consequences means businesses and organisations can:

- Understand their capability to perform in an emergency.
- Comply with legislation.
- Identify shortfalls.
- Financially plan.
- Create auditable document trails.
- Prepare response plans.
- Increase technical knowledge.

In addition, adopting a scientific approach through applying fire engineering principles will help facility managements understand:

- How to carry out detailed fire hazard analysis and determine firefighting requirements in varying weather conditions.
- The preventive and protective measures necessary to limit the consequences of fire.
- The systems and equipment required to detect, suppress and control potential fire-related incidents.
- The direction and control of equipment and resource required in the function of firefighting and rescue operations.
- Assess tertiary containment capabilities versus fire water demands to aid the development of an effective fire water management plan.
- Assess fire hazard consequences if a controlled burn is deemed appropriate and advise on appropriate mitigation requirements to support a measured and justified controlled burn strategy.

PETROCHEMICAL FIRE READINESS



How Can an Outsourced Emergency Response Organisation Help?

Choosing the right emergency preparedness partner comes down to selecting a company where all operational personnel are rigorously trained every aspect of firefighting techniques and, ideally, medical emergencies and security-related incidents requiring a carefully structured approach.

When it comes to advice on outsourcing of emergency response, planning and development of emergency training and exercising, risk management or technical advice, it is essential that the selected company has decades of experience in assessment, prevention, preparedness, response and recovery. This is certainly not an environment where “learning on the job” is a viable or acceptable option.

The Sembcorp model for emergency response on petrochemical sites epitomises the ideal offering in terms of customer benefits. It provides:

- Flexibility to meet the customer's needs.
- Safeguards to ensure consistent world-class standards of service.
- The facility management with time to focus on its own business.
- Flexibility to respond to changing legislation and response requirements.
- Emergency response today is a highly specialised service which most commentators agree is best provided as a core activity.



The Need for Technical Fire Plans

Expert fire engineering consultants have the ability to assess firefighting requirements and work with customers to develop specific tailored fire management strategies that incorporate:

- Pre-planning – consideration of incident management requirements in responding to and mitigating large incidents, plus the formulation of scenario specific fire plans.
- Hydrant Flow testing – to ensure the capabilities meet the demands required during an emergency.
- Exercising and testing – to ensure plans are workable and relevant as well as acting as a reminder to personnel.



Virtual Training for Real Emergencies

Software is now available to prepare emergency response teams and incident controllers for real-life incidents in a virtual environment. Sembcorp, for example, uses simulation software that allows trainees to experience the incident as they would in real-life. They assess the situation and



determine the best response strategy, implement it and then observe the consequences of their decisions. A perfect tool to train against pre-incident plans.

Industrial incident management

For company fire departments, first responders, incident command teams, employees working with hazardous materials and safety/health and environmental experts, the main focus of the Industrial Incident Management module is on the incidents that could occur on industrial sites. The instructor is able to create an environment similar to the work site. The module includes industrial incidents like tank fires, liquid spillage, gas releases, on-site collisions and many more.

Classroom Training

An instructor and multiple trainees participate. One trainee is assigned the leadership role and



takes the controls during the scenario. The other participants assist and discuss which decisions are to be taken. This module focuses on the interaction between the trainees. During this training, trainees will each have a different approach to an incident. By discussing and simulating these various approaches, the group of trainees will learn to determine the best possible solution to a realistic problem.

One-on-One Training

For training in a specific role during an incident, an individual trainee is trained by the instructor. Due to the direct communication and feedback that the instructor provides, the trainee is able to achieve predefined learning goals. For a trainee, this training method is frequently experienced as an in-depth approach to their day-to-day activities.

By involving large-scale scenarios the trainee will be prepared for the incidents which cannot be trained for in real-life exercises. The smaller scale scenarios are used to prepare the trainee for evacuation, observation and taking the appropriate first steps.

Emergency Planning



Emergency planning has evolved so much over the past decade; it is no longer an academic philosophy. Nor is it about having well written procedures. It is more about an organisation's ability to physically demonstrate to the regulatory authorities a business state of preparedness should an emergency situation occur.

IFF

Nick Lynd is a fire engineer at Sembcorp Protection

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ADVERTISERS' INDEX

Alert Disaster Control	4
Argon Electronics	49
Argus Thermal Imaging	45
Bauer Kompressoren	39
Bristol Uniforms	15
Bronto Skylift	28
Con-Space Communications	53
CTE Lift	48
Dafo Fomtec	IBC
Devon & Somerset Fire & Rescue Service Training Academy	20
Dr Sthamer Hamburg	11
Dynax Corporation	40
Emergency Services Training Institute (Texas A&M)	37
FDIC	2
Goliath Footwear	13
Haagen Fire Training Products	23
Holmatro	59
Hytrans	37
Iveco Magirus	60
Kenex Engineering	23
Kussmaul Electronics	31
KV Fire Chemicals	43
Mobiltex Escape Systems	13
On-Scene Solutions	29
PAB Akrapovic	17
Paratech Inc	55
Plastisol	30
Quiroga Fire	6
ResQTec	50
Rosenbauer International	OBC
Skedco Inc	9
Super Vacuum Manufacturing	19
Task Force Tips Inc	IFC & 1
Tempest Technology	63
The Fire Service College	14
Waterous Company	24
Yone Corporation	34



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